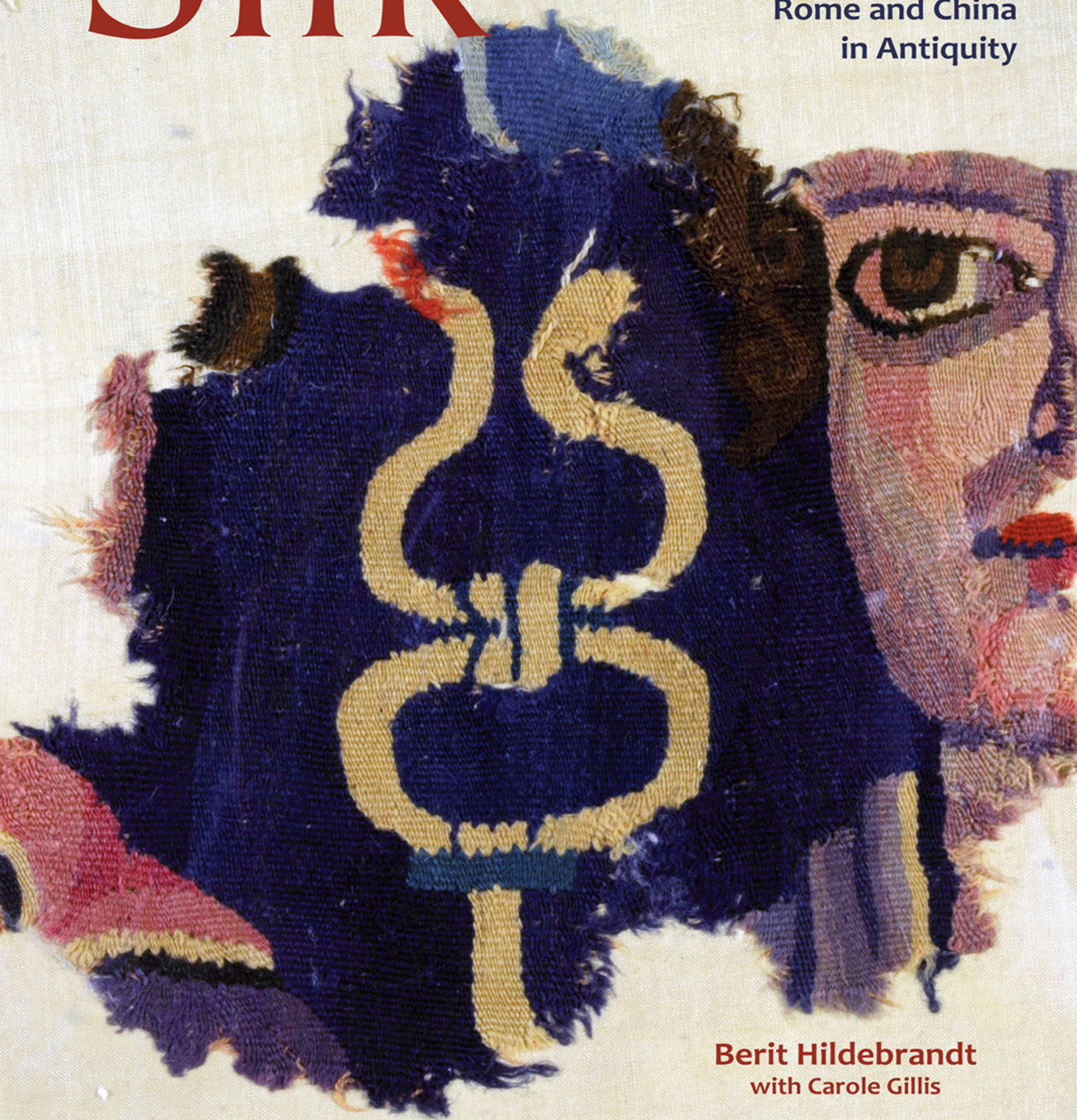


Silk

Trade and Exchange along
the Silk Roads between
Rome and China
in Antiquity



Berit Hildebrandt
with Carole Gillis

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SILK

ANCIENT TEXTILES SERIES 29

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TRADE AND EXCHANGE ALONG THE SILK ROADS
BETWEEN ROME AND CHINA IN ANTIQUITY

Edited by

BERIT HILDEBRANDT
with CAROLE GILLIS

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Front cover: Wool fabric with Hermes, the Greek god of trade, excavated by Sir Marc Aurel Stein (inv.no. L.C.iii.010a).
Courtesy of the National Museum, New Delhi.

Back cover: Reconstruction drawing based on a silk samite from Antinoë (drawing: Thelma K. Thomas, based on Louvre inv. E 29367; after Martiniani-Reber 1997, cat. 35, p. 20 © Musée du Louvre (M. Chuzeville – cat. n° 75 - and Ch. Larrieu – cat. N° 35 -)(here: Fig. 5.20); used by permission)

To the memory of
Irene Lee Good
(1958–2013)

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Robert E. Murowchick, Angela Sheng and Kaoru Ueda

Preface

The idea of compiling this volume was born during a workshop generously funded by the Volkswagen Foundation within the framework of a Volkswagen Fellowship Symposium at the Mahindra Humanities Center at Harvard University that took place from April 21–22, 2012. Since then, this volume about the Silk Roads has traveled a long way, with contacts stretching from China through Europe to the United States and back.

I am very grateful to all the people who over the years so generously and patiently have contributed their time, help and advice to this project.

In particular I want to thank the speakers and respondents at our workshop, where and with whom it all began. Many thanks also go to the staff at the Mahindra Humanities Center, who made this event possible: Homi Bhabha, Steven Biel, Shannon Mackey, Mary Halpenny-Killip and Sarah Razor. We set out as a group of scholars specialized in Ancient World Studies, Chinese and Indian history and archaeology and ancient textile research who met to discuss the production, use and exchange of silk along the Silk Roads. I am grateful to J. Mark Kenoyer (University of Wisconsin, Madison), Liu Xinru (The College of New Jersey), Peter Fibiger Bang (University of Copenhagen), Beate Wagner-Hasel (University of Hannover), Thelma K. Thomas (New York University), Lillian Lan-ying Tseng (New York University), Zhao Feng (China National Silk Museum Hangzhou and Donghua University Shanghai) and the late Irene Good (University of Oxford) for accepting the invitation to give a talk, and to Richard H. Meadow (Harvard University), Marie-Louise Nosch (University of Copenhagen), Mary Harlow (University of Leicester) and Angela Sheng (McMaster University, Hamilton, Ontario) for acting as respondents.

Sadly, Irene Good's ill health would not allow her to participate in the workshop or contribute to the proceedings, although she refused to give up her plan to do so until the very end. With her untimely death, we have lost a generous and brilliant colleague whose presence is still deeply missed. We have thus decided to dedicate this volume to her.

I am still overwhelmed by the generosity of the colleagues who stepped in. Angela Sheng, who would have acted as Irene's respondent at the workshop, agreed to outline Irene's contribution from her abstract, which ended in a masterly contribution on the exchange of weaving techniques along the Silk Roads. Angela also contacted Robert E. Murowchick and Kaoru Ueda at Boston University, who together wrote a wonderful tribute to Irene. When it turned out that the contributions regarding the Eastern perspective on exchange on the Silk Roads outweighed the Western ones somewhat, Adam Hyllested (University of Copenhagen) luckily joined us and added the linguist's perspective to this volume.

I am also very grateful to Marie-Louise Nosch who offered to publish this volume in the *Ancient Textile Series* of the Danish National Research Foundation's Centre for Textile Research (CTR) and offered comments on the contributions. Eva Andersson-Strand (CTR) was always supportive of the project. I also thank the publishing staff at Oxbow, in particular Clare Litt, Julie Gardiner, Hannah McAdams and Mette Bundgaard, who have guided this project efficiently and patiently.

I would have despaired in the face of international publishing permissions, difficult-to-find bibliographical references and photoshop-related challenges without the capable student assistants at CTR who

kindly and patiently helped whenever their time allowed: Ziff Julie Jonker, Sidsel Frisch, Philip Kristian Dons Madsen, Stine Marie Bøttern, Louise Villefrance Isted Ludvigsen and Line Lerke. The same is true for the kind support and expert advice given by my colleagues Lena Bjerregaard, Ulrikka Mokhdad, Kasper Grønlund Evers and Peder Flemestad, and by Katharina Yu and her team for their help with Chinese translations. I am deeply indebted to Cherine Munkholt for her invaluable advice regarding all editing-related questions. Carole Gillis was the most amazing editing support imaginable and an astute reader, who greatly improved not only the texts, but also the contents – without her, this volume would never have become what it is.

Another huge thank you goes to the peer reviewers, whose comments improved our volume greatly.

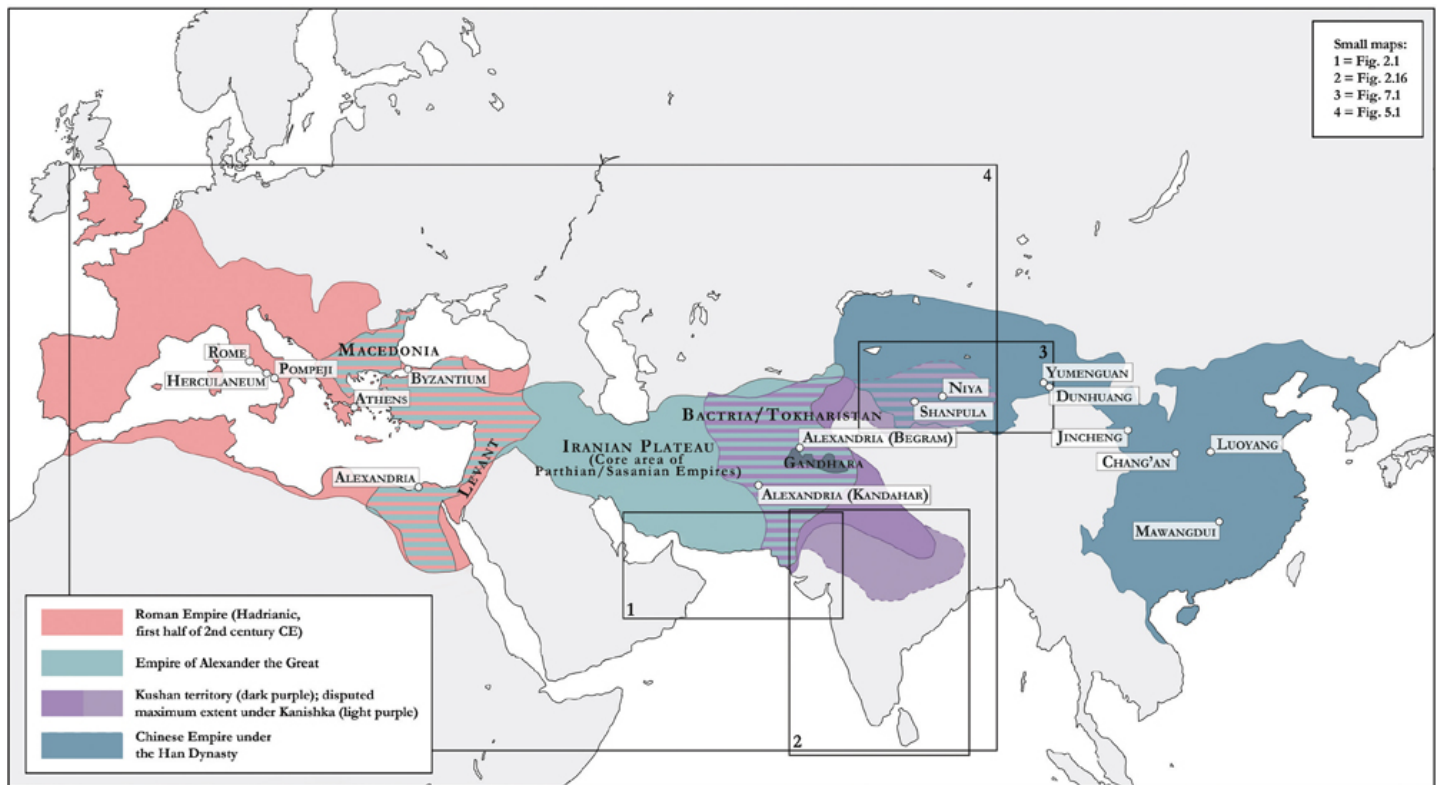
The support and generosity of different persons and institutions all over the world who helped with the acquisition of publishing permissions cannot be adequately expressed in words. The editor and the publisher gratefully acknowledge all the permissions granted to reproduce the copyright material in this book. Every effort has been made to trace copyright holders and to obtain their permission for the use of copyright material. However, the editor and publisher apologize for any errors or omissions and would be grateful if they were notified of any corrections that should be incorporated in future reprints or editions of this book.

This publication would not have been possible without the generous financial support of the Volkswagen Foundation, a Marie Skłodowska Curie Fellowship for a two-year research stay at the CTR, and Marie-Louise Nosch/CTR through an Anneliese Maier Research Award from the Alexander von Humboldt Foundation and support from CTR. I am most grateful to all for their support in making it a reality.

A note should be made on formal questions. We have not insisted on standardizing American and British spelling, abbreviations or measures (like BC and AD/BCE and CE). The same is true for the transcription of Chinese names that is consistent within one chapter, but varies between authors. Chinese authors and personages are referred to with their family name first and their given name second (the only exception being persons with Western first names and Chinese family names, in which case the order follows the Western use). This is true both for references and in the texts. Western authors are referred to in the conventional Western way. We have done our best to standardize the bibliographies, but learned from our Chinese colleagues that there are crucial differences that cannot and should not be eradicated. Modern editors of Chinese historical texts are often not specified (although the year of the modern publication is given), because in most cases, the projects were collaborative and initiated by publishers. Therefore it is not in the modern bibliographical convention in East Asian studies to list modern editors. In order to combine Western and Eastern reference systems, we have tried to steer a middle way by giving bibliographical data that allows readers to find the Chinese literature in the catalogues of the big American university libraries.

Finally, I want to thank the two persons who inspired me: Boris Dunsch (University of Marburg) who first drew my attention to the exchanges between Rome and China in antiquity and Beate Wagner-Hasel (University of Hannover) who suggested that I look at silk in particular.

Copenhagen/Lund 2015
Berit Hildebrandt



General map showing approximately the empires, territories and major cities mentioned in the volume along and around the Silk Roads (map by Berit Hildebrandt, with the kind support of Kasper Grønlund Evers and Lillian Lan-ying Tseng, drawing: Sidsel Frisch).

Introduction: Silk on the Silk Roads.

Exchange between East and West in Antiquity

Berit Hildebrandt

Already in Greek and Roman antiquity a vibrant series of exchange relationships existed between the Mediterranean regions and China, including the Indian subcontinent (see, e.g., Mair and Hickman (eds.) 2014; Ruffing 2002; Raschke 1978; Ferguson 1978; for the Chinese sources: Leslie and Gardiner 1996).¹ Among the many goods that found their way from East to West and vice versa were glass, wine, spices, metals like iron, and precious stones as well as textile raw materials and fabrics (see, e.g., Zorn and Hilgner 2010; Sevillano-López and González 2011; Sheng 2010; Selbitschka 2010), and of course the material that inspired Ferdinand von Richthofen to coin the name Silk Roads (Elisseef (ed.) 2000, 1–2; Żuchowska 2013; *Silk Roads Other Roads* 2002; von Falkenhausen 2000; Ma 1998; Watt and Wardwell 1997; Lucidi (ed.) 1994) – silk, a luxury item that was in great demand in the Roman Empire. Silk is produced by insects, more precisely the worms of the silk moths, when they spin themselves into a cocoon from which they hatch as a moth. It seems that the Mediterranean people knew at least two kinds of silk, cultivated and wild. The former is usually connected with the species *Bombyx mori* that was cultivated in China at least from the 3rd millennium BCE on and which feed on white mulberry leaves (for early Chinese finds, see Kuhn and Zhao (eds.) 2012, esp. chap. 2 by Peng Hao, and Kenoyer's contribution in this volume; see also Vainker 2004). Today, many different species of wild silk moth live all over the world and were probably also widespread in antiquity, including the Mediterranean area, Middle Asia and East Asia. These silks differ in appearance and quality. *Bombyx mori* silk has a very white, very fine and even thread because under controlled cultivation conditions, the moth is killed before it can hatch through the cocoon, thus breaking the silk threads that it has spun around itself. Therefore the thread can be reeled off as a single thread that is said to reach up to c. 2 km and does not need to be spun like shorter fibers, such as the threads of most of the wild silk moths. Since these wild moths are normally not prevented from hatching, they break their silk threads, which necessitates spinning the threads. Of course, even wild silk moths can be monitored and killed before hatching: thus, unspun versus spun thread cannot be the only criterion to distinguish wild and cultivated silks. Another important difference is the color. Wild silks are not white like *Bombyx mori* silk, but come in shades of gold, beige, a greenish hue and light brown, depending on the plants the moths feed on. According to most recent cutting-edge research (see Kenoyer, Chap. 2 this volume; Good, Kenoyer and Meadow 2009), the use of (wild) silk in India started probably around the same time as in China, in the 3rd millennium BCE (earlier Chinese finds are disputed: Mark Kenoyer, pers comm). However, research is divided on the question of when and where the use of wild silk and cultivated silk was first known in the Mediterranean area (see Good 1995 and 2011 and Bender Jørgensen 2013). A calcified chrysalis of the wild silk moth species *Pachypasa otus* that might be dated to the middle of the second

millennium was found on the Mediterranean island of Thera, but the find context is disturbed (Panagiotakopulu 2000, esp. 86–94). Neither Bronze Age iconography nor Mycenaean Linear B writing (Panagiotakopulu 2000, 77–79) gives any clear indication that knowledge of silk as a textile material existed, even if the moths were indigenous to the area. Silk is extensively visible only in the written ancient sources from the 1st century BCE on (see Hildebrandt, Chap. 4 this volume). For the question of Mediterranean silk production, Procopius is still our main source. He claims that silkworm eggs were smuggled to Byzantium in the 6th century CE by order of Emperor Justinian, who allegedly wanted to avoid expensive imports. If this statement is true, silk in the Mediterranean area before that time was probably imported: only further scientific analyses of textile finds will perhaps indicate whether from China, India or other regions. However, the Silk Roads seem to have played a crucial role in the supply of the sought-after material.

Against this background, it seems astonishing at first glance that the production and exchange of silk along the Silk Roads to the West have not been treated as extensively as other Silk Road topics in Ancient World Studies, although the Silk Roads have fascinated scholars of different areas and disciplines for a long time.² The main goal of past pursuits, inspired by travel and excavations in Central Asia during the 19th and 20th centuries (Trümpler (ed.) 2010), was rather the identification of ethnonyms and toponyms in the areas between Rome and China (Dihle 1984; Herrmann 1968). A major focus of current research in Ancient World Studies is still aimed at geographical questions like the investigation of land and sea routes to India (for example, the sea routes via Egypt and Arabia), which were of great significance for political and diplomatic contacts along the Silk Roads (most recently Speidel 2015) and also for trade relations (e.g., Casson 1989; Begley and de Puma (eds.) 1991; de Romanis 1996; de Romanis and Tchernia (eds.) 1997; Young 2001; Tomber 2008; Neelis 2011; de Romanis and Maiuro (eds.) 2015; Cobb 2015). Recent studies focus on the forms of organization and the character of ancient long-distance trade (Evers 2016; Bang 2008 and 2009; see also the research and publications of the “Stanford Ancient Chinese and Mediterranean Empires Comparative History Project”, directed by Walter Scheidel³), as well as on the economic structures in the ancient Mediterranean area that formed the basis for far-reaching exchange connections (Terpstra 2013; Ruffing 2014; Seland 2014; Wagner-Hasel 2011).

The Silk Roads have not ceased to fascinate us and have received a lot of scholarly attention in recent years (Hansen (ed.) 2012 and Hansen 2012; Liu 2012 and 2010; Beckwith 2009; Liu and Shaffer 2007; Wieczorek and Lind (eds.) 2007; Zhang 2005; Höllmann 2004). They were not a closely interlinked system of transport, even if the modern term suggests otherwise. They comprised sea, river and land routes that led from China via the Tarim Basin to India and further on via the Red Sea, the Persian Gulf, the Euphrates and the Nile, respectively, and various caravan routes to the Mediterranean area. Nor was there any direct contact between the Roman and Chinese Empires in the periods we looked at. Exchanges were always mediated through peoples and middlemen along the routes. Where their regional networks intersected was where the exchange of products from one cultural sphere to the other took place (Evers 2016; Bang 2008 and 2009). An important place of exchange was Palmyra in the Syrian Desert, which was the starting point for caravans towards the Arabian Gulf (Seland 2014; Terpstra 2013; Żuchowska 2013). The tombs of Palmyra have also yielded a considerable number of silk textiles made from cultivated and wild silk. Weaving patterns and motifs suggest both Chinese and local Mediterranean silk fabric production, while some embellishments might have been added in yet other regions (Schmidt-Colinet and Stauffer, with al-As‘ad 2000; Stauffer 1996). In comparison with commodities like glass or metals, silk has several advantage: it is not breakable (though it can be torn or damaged), fabrics can be folded or tightly rolled and even used as wrapping material for other goods in order to reduce their volume, it is a light material, and since the uses of textiles are widespread and very varied, ranging from saddle cloths to blankets, cushions, curtains and clothing, silk products are likely to be sought after across cultural borders (on cross-cultural elite display, see also Canepa 2010). However, due to highly varying conditions for the preservation of organic materials in different climatic regions, our evidence for silk in

ancient times is very fragmentary. Deserts and tombs in China, the Tarim Basin, and Eastern Mediterranean areas like Syria and Egypt, as well as tombs in Russian permafrost soils helped to preserve pieces of fabrics in an extraordinarily good state, even in some cases with their original shapes and colors all intact. In other regions with high humidity like the Indian subcontinent or Central and Northern Europe, organic material perished more quickly if it was not preserved in, e.g., the interior of architectural structures like temples, churches or tombs, and sometimes only remained as a pseudomorph on metal objects, or survived in the special chemical conditions of bogs.

Thus the number of archaeological finds can give only a faint picture of the exchange of silk and other textiles along the Silk Roads. Recent research has shown that textile production was the second-largest economic sector in the Roman Empire, although the majority of textiles consisted of materials like linen and wool and were produced for use in every-day life (Ruffing 2008, esp. 80–81, 185–187; see also Droß-Krüpe 2011). Luxurious textiles like purple wool and silk were used for conspicuous consumption (for wool, see Wagner-Hasel 2015; on consumption, see Veblen 1899; Foxhall 2007, esp. 233; von Reden 2007). Literary sources from the beginning of the Roman Empire until Late Antiquity give us a vivid impression of the great extent that luxurious silk products were appreciated by the elites of the Roman society, even though moralizing Roman authors condemned the use of the material (Hildebrandt 2009; Hildebrandt 2012a). In her book *The Politics of Immorality*, Catherine Edwards analyzed luxury discourses in Rome during the late Republic and the early Principate (roughly the 1st century BCE to the 1st century CE) (Edwards 1993). She was able to demonstrate that the consumption of and predilection for luxurious goods, especially those of Eastern origin, served as examples *par excellence* for an allegedly barbarian and feminine lack of self-containment against which idealized Roman virtues and political leadership qualities could be discussed. In contrast to Roman moral discourses that mirror mainly the views of the senatorial elite who used this rhetorical tool to control their peers (Edwards 1993), silk did not just satisfy an “addiction to luxury” on the part of effete individuals with weak character:⁴ more importantly, it fulfilled diverse central functions, for example as a status symbol and means of distinction for the political elite, as a (diplomatic) gift and payment to subordinates and functionaries of the Emperor, as tribute and, in Turfan during the 7th and 8th centuries, as currency (for Rome: Hildebrandt 2009 and 2012a; for China: Raschke 1978; for silk as money, see Wang and Hansen (eds.) 2013). The Turfan documents, written in the Tocharian B language, mention the word *kaum**, which designated the value of horses. The etymology of the word is not clear, but the context suggests that it referred to textiles and can thus be reasonably interpreted as silk because of the well-known exchange of horses for silk between nomads and the Chinese court (Ching 2011). In recent years, more and more studies on dress, the textile trade and in particular the production and exchange of textiles have been conducted. Because of its extraordinary qualities and high value in different cultures along the Silk Roads, silk more than other traded commodities allows us to understand both the economical and the political dimension of trade in ancient cultures, and permits insights into the development and transfer of textile technologies between East and West.

The aim of this volume is to connect research from different areas and disciplines dealing with exchange along the Silk Roads. In order to look into the many ways in which silk was exchanged along them, and to discuss future research, we convened at the Mahindra Humanities Center at Harvard University USA in 2012, a conference funded by the Volkswagen Foundation. The historical, philological and archaeological contributions collected in this volume aim at highlighting silk as a commodity, gift and tribute, and as a status symbol in varying cultural and chronological contexts between East and West, including technological aspects of silk production. Far from aiming at an exhaustive picture, our goal was to create an awareness of each other’s disciplines and methods and to discuss different angles of research on silk. Our chronological starting points were Rome and China in antiquity, meaning that the time period we considered ends in the late fifth century CE, with the Roman Empire being transformed into the Byzantine Empire. In the East, the Chinese Han dynasty ended in 220 CE and was followed by the Three Kingdoms (220–265 CE), the Western Jin (265–316

CE), and Eastern Jin and Sixteen Kingdoms (317–420 CE). However, we also looked into earlier and later epochs in order to gather an understanding for developments and changes in long-distance relations that involved silk.

At the conference the ramifications of long-distance trade from a Western perspective were admirably taken up by Peter Fibiger Bang and Beate Wagner-Hasel. It would have been ideal to have been able to include their contributions for the Western perspective and its relation to the East in this volume. However, as this was not possible, I have taken excerpts here from their talks and added further information in order to more fully complement and balance the view from the East as presented here by Liu, Kenoyer and Hyllested (although Hyllested did not participate in the workshop, he very kindly agreed to contribute an article here; see also Wagner-Hasel 2015).

Regarding the view from the West, it does seem to be true that considerable sums were spent on luxury goods from the East, among which one can count the precious silks. Unfortunately, no papyri with trade transactions regarding silk have survived, and the only numbers referring to prices stem from the Edict of Diocletian on maximum prices (see Hildebrandt this volume, Chap. 4). We must therefore rely heavily on literary sources for more information, although it can be argued that they mention only high numbers as a rhetoric tool in order to condemn Eastern luxury goods (see Edwards 1993). Tacitus reports that Emperor Tiberius complained about the enormous sums of money that went abroad “to provide Roman women with luxury goods” (*Annales* 3,53). Pliny the Elder mourns the 50 million sesterces that allegedly went into the trade with India per year, and the 100 million sesterces for the trade with *India, Arabia* and the *Seres* together (Pliny the Elder, *Natural History* 6,26,101; 12,41,84; on the *Seres*, see below). In another passage, he criticizes that men go to the *Seres* in order to obtain (silken) garments (Pliny the Elder, *Natural History* 12,1,2). However, a papyrus that probably comes from Egypt and is dated to the middle of the 2nd century CE seems to corroborate the information that huge sums were involved in the trade with the East (*Papyrus* SB 18/13167). It is a contract regarding a voyage to Muziris to purchase goods (one of the cities that traded silk as mentioned in the *Periplus Maris Erythraei*, a handbook for maritime trade with India from the 1st century CE, see Hildebrandt this volume, Chap. 4) that concerns a loan connected to sea trade. The text lists several precious goods (though unfortunately no silks) valued at 1,151 talents and 5,852 *drachmai* of silver, all in all 6,911,852 *drachmai* after taxes, a dazzlingly high number (see most recently Evers 2016, 123–143; for the text, see Morelli 2011 and Rathbone 2000). Based on this papyrus, historians rated the volume of the trade with the East that is sketched by Pliny as credible (Drexhage, Konen and Ruffing (eds.) 2002, 137 and 264–265; Ruffing 2002, esp. 361–362). The *Seres* also provided other goods that were much appreciated in the West: colored skins or furs (Pliny the Elder, *Natural History* 37,78,204; *Periplus Maris Erythraei* 39, 9 (Casson)) and iron of the highest quality (Pliny the Elder, *Natural History* 34,41,145). The *Periplus Maris Erythraei* also lists the goods from the Mediterranean area that were in demand in the East: oil, olives, grain and wine, but also glass and textiles (for an overview, see Casson 1989). The ancient city of Berenike, an important port of trade on the coast of the Red Sea, has yielded archaeological finds of ceramics, metal and glass that came from the West, and among many others, cotton and pepper from the East, even if no mention of silk so far (Wild and Wild 2005; Sidebotham 2011). The exchange is also evidenced by the numerous Roman coins that have been found in different Indian contexts (see Suresh 2004, esp. 26–88). The *Periplus Maris Erythraei* also lists coins next to other traded goods like clothing, spices, textiles, coral, glassware and perfumed oil (e.g., *Periplus Maris Erythraei* 39 (Scythian Barbarikon) and 49 (Barygaza on the northwest Indian coast) (Casson)). The life of a trader in high-end and exotic goods is satirically characterized by Persius in a text that can be dated some time after the middle of the first century CE (Persius *Satura* 5, 134–137; on the interpretation, see Kißel 1990, 53–54; 704–5): a trader has to get up very early in order to be the first to get his hands on precious goods and delicacies like Black Sea herring, Coan wine, ebony, incense and pepper, just when “the camel is still thirsty”, sealing the deals with (true or false) oaths. This passage also shows that the flow of goods was by no means

stable and accountable, and that the number of goods that had successfully traveled by land and sea until it reached the Mediterranean was limited; moreover, fraud was obviously a frequent feature in transactions connected with luxury goods (and we can only guess how many “silks” were actually made of other fine fibers, but sold at the very high prices that silk commanded). However, anything more than a statement about the extraordinarily high prices of silk (see also Hildebrandt this volume, Chap. 4 for the silk prices in Diocletian’s Edict) is difficult to make. Any attempt at calculating exact amounts for Roman trade with the East must be based on assumptions, since reliable and unambiguous numbers are missing. Thus modern research results vary considerably (see, e.g., Scheidel and Friesen 2009). Perceptions about the nature and volume of Roman trade with the East also depend strongly on the underlying models of exchange, as Wagner-Hasel and Bang have stressed in their talks. In some recent publications, long-distance trade is likened to modern market models that are based on supply and demand (McLaughlin 2010; 2014). Bang has made a strong point, though, saying that the ancient Silk Roads cannot be perceived as predecessors to modern global trade networks or likened to the early modern East India companies (Bang 2009). He argues that ancient markets were not self-regulating, interlinked systems, but instead rather similar to Oriental bazaars, which integrated the conversion of an agrarian surplus, long-distance trade, auctions and money-lending. Therefore, we cannot assume that a merchant in any of the regions involved commanded a network that was able to control the exchange of goods along the entire route between East Asia and the West, something which is supported by the lack of mutual knowledge about the respective peoples at the Western and Eastern ends of the Silk Roads. Moreover, connections throughout all of antiquity depended on changing political and environmental factors (stressed by Thorley 1971). Personal trading networks that worked like clientele systems seem to have played an important role in providing information (Terpstra 2013). However, in a most recent study on the trade between the Mediterranean and the Indian Ocean, Kasper Evers came to the conclusion that the trade “was organised at the centres of demand and supply, in Rome and India, respectively, by comparable urban associations, the transport in-between being handled by equally well-organised groups of seagoing merchants,” so “that the institution of the market in Antiquity was able to facilitate trade over very long distances” (Evers 2016, 248).⁵

A similarly complex picture emerges when one looks at the consumers of silk, and the reasons for their desire to acquire silk. The large number of ethnicities and persons involved in the exchanges of goods along the Silk Roads also meant that these goods could take on different meanings. Bang asked therefore in his talk at our workshop which factors “motivated consumption of enigmatic goods from afar.” He referred to the concept of archaic globalization by the historian C. A. Bayly (2002, 51–52), who stated:

Modern ‘positional’ goods are self-referential to themselves and to the markets that create demand for them; the charismatic goods of archaic globalization were embedded in ideologies which transcended them. In one sense archaic lords and rural leaders were collectors rather than consumers. What they did, however, was more than merely to collect because the people, objects, foods, garments and styles of deportment thus assembled changed the substance of the collector.

As Bang pointed out during his presentation, the underlying forces that shaped the demand for the exotic were “universal kingship, religious cosmology and, finally, astrological and humoral theories of society and the body.” He maintained that while universal kingship meant command over a vast variety of people and commodities, cosmological and religious rituals needed rare, exotic and charismatic objects for their enhancement, like incense, and astrological and humoral theories of society and the body had an ideal of balance produced through the combination of things representing different sentiments and climates, not least in the field of medicine. The formation of the Chinese Empire under the Qin and Han dynasties and of the Roman Empire between the 3rd and 1st centuries BCE pushed both the borders of the geographical spheres of influence on both sides and the quest for exotic goods to enhance the power of the new elites and rulers (see also Bang 2009).⁶

In her contribution **‘Looking towards the West – how the Chinese viewed the Romans’**, **Liu Xinru** from the **Department of History of the College of New Jersey/Ewing** points out what Chinese writers in the time of the Han Empire knew about the roughly contemporary Roman Empire, and what this information can tell us about silk and the silk trade along the Silk Roads. We can trace the desire for exotic textiles (that went both ways on the Silk Roads), in particular silken and woolen ones, in Chinese writings and through finds of textiles with Western influence in Central Asia. The two empires together accounted for about half of the population on the Afro-Eurasian landmass during the first couple of centuries CE, but there were no direct diplomatic or trade contacts. However, it was already in the late 2nd century BCE, with a Chinese mission to Bactria, that the Chinese came into contact with the Hellenistic world and the numerous cities founded by Alexander the Great and his successors. From then on, information about the big empires on both ends of the Silk Roads traveled back and forth, but it was often clad in mythical tales and mediated by many peoples speaking many different languages. Therefore it does not come as a surprise that Chinese transliterations of Western place names are still disputed, as Liu shows. However, in the time after the beginning of the Common Era, Chinese texts show an awareness of Rome as an empire that was comparable to the Han Empire. Under the influence of Greek-speaking people, the Chinese formed the impression that the ‘Romans’ were Greeks. This corresponds to the real situation in the Greek-speaking Eastern Mediterranean regions where the caravan routes ended. More puzzling are the reports in Chinese literature that tell us that the regions that can be interpreted as belonging to the Roman Empire produced silks, glass and wool textiles that were desired by Chinese elites. We also find Chinese texts that support the idea that Chinese silks were unraveled in the Roman Empire (on the Western sources, see Hildebrandt 2012b). Liu suggests that they rely on information that was distorted by Greek-speaking traders, since early Roman sources praise fine, diaphanous silks that could correspond to Chinese gauze silks. Re-used silk yarn on the other hand would have had to be spun and thus would have produced a much rougher fabric (on the unraveling of silks, see also Zhao Feng’s contribution in this volume, Chap. 7; Zhao suggests looking no further west than the Tarim Basin, where we find archaeological evidence for unraveled and rewoven silk). Even if the focus of this volume is directed towards silk, it has to be stressed that the exchange of woolen fabrics along the Silk Roads was as important as that of silk. Among the archaeological textile finds from Central Asia, we find motifs with strong influences from Hellenistic and Hellenized cities (see, e. g., the splendid wool tapestry with the head of the Greek god Hermes that was found in the Tarim Basin and reproduced on the cover of this volume).

Textiles in South Asia are the subject of **J. Mark Kenoyer, Professor at the Department of Anthropology, University of Madison/Wisconsin**. In his contribution **‘Textiles and Trade in South Asia during the Proto-Historic and Early Historic Period’**, he presents a wide, critical overview of the origins of textile making in South Asia in general and India in particular, and of trade connections between South Asia and West Asia between 2600 BCE and 300 CE, combining texts and archaeological evidence like depictions of fabrics and remains of textiles and fibers alike. Special attention is paid to fine textiles including cotton, wool and silk that may have been produced for use by local elites as well as for external trade. Kenoyer shows that the earliest trade connections between the Indus Valley and West Asia began with overland and maritime trade during the period of the Indus Civilization, circa 2600–1900 BCE. He analyzes the subsequent periods of intensive exchange during the periods of the Mauryan and Kushana Empires, dating between 300 BCE to around 300 CE, including the production and trade of fibers and textiles and the evidence for connections with the Mediterranean and later Roman world. Of particular importance for the topic of this volume are Kenoyer’s explanations regarding the ancient texts, the fiber sources and his cutting-edge insights into ‘wild’ silk production in India and its role in ancient textile trade. He demonstrates that wild silk was already in use during the Harappa period, i.e., the 3rd and 2nd millennia BCE. Of particular value for Ancient World Studies are his analyses of words for silk in Indian texts and his historical conclusions, as well as his discussion of the different silk moth species that might have produced these silks. His research profoundly changes our

traditional picture of the silk trade with China as the main silk provider for the Mediterranean area and opens up completely new ways of thinking about silk exchange along the Silk Roads for all subsequent periods.

In the contributions so far, the exchange of silk along the Silk Roads was examined through archaeological finds and the interpretation of historical texts. The contribution of **Adam Hyllested, Postdoctoral Fellow** in the **“Roots of Europe” project** at the **Department of Scandinavian Studies and Linguistics** at the **University of Copenhagen** deals with **‘Word migration on the Silk Road: the etymology of English *silk* and its congeners’**. Hyllested, who kindly agreed to contribute to the volume even though he came on board only after the workshop at the Mahindra Humanities Center took place, seeks to address exchanges along the Silk Roads and especially the ways in which silk reached the West by discussing the etymology of the word *silk* in Western and Northern European languages from antiquity to modern times. The chronological scope of his article is of necessity great in order to better understand the different notional concepts through which the material was classified, the different routes the silk trade could have taken and the ethnic groups who were involved. He points out that the term was transmitted together with the trade in silk fabrics along the Silk Roads and can thus be regarded as a typical historical *Wanderwort*, where the ultimate origin is considered rather obvious but where the ways of transmission are less certain. In this particular case, though, the transcontinental Silk Roads constitute concrete historical routes along which one can try to trace the word and its intermediate stations on its way from East Asia to Europe.

Considering the volume’s chronological frame, it is particularly important to note that according to common agreement among linguists, Classical Greek σηρικός (*sērikós*) ‘silken, of silk’, substantivated σηρικόν (*sērikón*) ‘silk’, transferred into Latin as *sēricus* and *sēricum*, is formed from the same root as English *silk*, all of which can be traced back to Old Chinese, the language of the area where the cultivation of Chinese silk presumably began in the 3rd millennium BCE. The word referred however not only to raw silk and silk fabric directly, but also to its oriental origins. The Σῆρες (transliterated *Sēres*, Latin form *Sērēs*), ‘silk men’, were initially of unknown ethnicity to the Greeks and Romans because they acquired the silk via middlemen who transported it to the West from trading stations in Central Asia. Hyllested deduces from their name that the Chinese sequence *sī rén*, or whatever exact form was the starting-point, must have been transferred via Central Asiatic peoples to Europe and European languages: it cannot have been borrowed directly by European languages. He comes to the conclusion that nomadic tribes played an important role in the distribution of silk. In particular, he attributes a key role to the Alanic language in transmitting the term for silk from China to Northern and Eastern Europe from at least sometime in the seventh century CE and on. During the Viking Age, silk was brought to Northern Europe by the Varangians, Nordic merchants who traveled through Kiev Rus and reached Constantinople, where they traded with local merchants. Tracking the exact routes of different *Wanderwörter* and their chronology will be the task of future joint linguistic, archaeological and historical research endeavors.

In her contribution entitled **‘Silk production and trade in the Roman Empire’**, **Berit Hildebrandt** from the **Danish National Research Foundation’s Centre for Textile Research at the University of Copenhagen, Denmark** looks into silk trade and production in antiquity. Latin and Greek had different terms for silk, one of them, *serica*, related to the *Seres*, the “silk people” on the Eastern ends of the Silk Roads who were endowed with mythical traits (see also the contributions in this volume by Liu, Chap. 1 and Hyllested, Chap. 3). Other terms seem to relate to the kind of silk, in particular wild silk (*bombycina*), and the form in which silk was traded, more precisely silk skeins (*metaxa*). Although Aristotle is considered the first ancient source for silk and an indigenous silk production in the Mediterranean area, clearly datable texts appear only much later, at the turn of the 2nd to the 1st century BCE, i.e., roughly at the time when Egypt was conquered by Rome and direct access to the sea routes to India were gained. As is argued, this huge time gap leaves room for doubt regarding when silk was first known and first cultivated in the Mediterranean area (Hildebrandt in preparation). Rather than assuming an indigenous production already in classical times, we should consider the

new Indian evidence and still include the East among the possible sources for silk until Late Antiquity. The argument is corroborated by doubts about the dating of the supposedly earliest silk finds in the Mediterranean area and the ancient literature itself that mentions the introduction of silk worm cultivation in Byzantium beginning at the earliest in the 6th century CE (see Hildebrandt this volume, Chap. 4). Still, Roman occupational names like that of the *sericarii* prove that already from the 1st century CE and on, diversified jobs related to the spinning, weaving and maintenance of silk fabrics as well as the silk trade existed. However, the ancient texts very often do not differentiate between places of production and places of trade, and information about the traders in the East is sparse and mixed with mythical features.

It is the perspective of the consumers who lived in different cultural spheres along the Silk Roads that **Thelma K. Thomas** from the **Institute of Fine Arts at the New York University** addresses in her investigation on **‘Perspectives on the wide world of luxury in later Antiquity: silk and other exotic textiles found in Syria and Egypt’**. Thomas’ focus lies on textile finds from the sites of Panopolis and Antinoë in Egypt, and from Palmyra and Dura Europos in Syria, two of the wealthiest provinces of the Roman Empire, with good archaeological documentation that allows us to get a first-hand visual impression of the wealth of textile colors, patterns and techniques along the Silk Roads. She is particularly interested in textiles that may be identified as exotic by their (imported) material, rare weaving techniques, the style of clothing or distinctive ornamentation like shaded bands, for example. By analyzing different archaeological examples, she is able to show that the silk finds (and other fabrics like wool) from these sites mirror cosmopolitan tastes and preferences for the exotic both in local production and through long-distance trade and imports by land and sea. In their motifs, compositional types, color schemes, and techniques, these textiles attest to a range of shared values that can be achieved only through active, conscious and continued cross-cultural exchange across Central Asia and the Indian Ocean to the Eastern Mediterranean. Inspired by Liu’s work on *Silk and Religion: An Exploration of Material Life and the Thought of People, AD 600–1200* (1998), which considers commerce as a vector for the spread of religion, Thomas proposes that such textile finds may also reflect a network of associations that links exoticism of material and technique, motif and design to prosperity and luxury, cosmos and commerce in a conceptual construction of the Late Antique world. She thus reflects on the question of how the silk finds attest to an on-going cultivation of the exotic through “global” trade in luxury goods and how they figure in universalistic discourses.

The meaning of silks in different cultural contexts is a topic that is also addressed by **Lillian Tseng** from the **Institute for the Study of the Ancient World of New York University**. In her article **‘Decoration, astrology and empire: inscribed silk from Niya in the Taklamakan Desert’**, she focuses on a piece of brocade unearthed at Niya in the Tarim Basin, an area loosely termed as “Western Regions” in Han China (207 BCE- 220 CE). In particular she is interested in the interpretation(s) of a Chinese inscription woven into silk trimmings of clothing in the princely burial in Tomb 8 at Niya that was excavated in 1995. The brocade bears an inscription that indicates a sign of military astrology: “The convergence of the five planets would benefit the Middle Kingdom.” Even if a person outside Han China were able to read the Chinese characters, the question remains of whether the fabrics would be infused with new meaning (see also Lothar von Falkenhausen 2000 on the silk finds with Chinese writing from Palmyra). Intriguingly, the design on the brocade has nothing to do with stars or military actions, but adopts the omen design popular in the heartland of the Han Empire. Tseng examines domestic contexts in which both the astrological inscription and the omen design were evident, and then explores possible international concerns that fused both text and textile into one entity. The author finally draws conclusions about the possible allegiance of the ruler of Niya with the Han Dynasty in the 3rd century CE.

Zhao Feng, **Donghua University Shanghai and China National Silk Museum Hangzhou**, discusses **‘Domestic, wild or unraveled? A study on tabby, taqueté and jin with spun silk from Yingpan, Xinjiang, third-fourth centuries’**. Zhao’s study contributes to the debate on the unraveling of imported Chinese silk in

the Roman Empire (see Hildebrandt 2012b on the philological evidence on the Roman side). He presents some of the results of a detailed study on the silk textiles excavated from Yingpan, Xinjiang that are mostly dated to the 3rd to 4th centuries CE. He and his team are able to distinguish between three major types among the silk textiles analyzed (that can be dated to the 2nd to 5th centuries CE): *tabby*, *jin*-ribbon in warp-faced compound *tabby*, and *taqueté* in weft-faced compound *tabby*, all of which are woven with spun silk fibers, in a strong Z-twist. Zhao's analysis of the fibers, especially the cross-section shapes, indicates that the silk material used in the area under investigation consists not only of the cultivated silk from the mulberry silkworm of the Chinese heartland, but also of some local silks. More importantly, he argues that the spun silk threads are made from cultivated silk and were probably reused by local weavers. He relates this evidence to the historical Chinese documents that mention that the Daqin people (who are mainly interpreted as the Romans by scholars of Ancient World Studies, as mentioned above) took threads from Chinese silk textiles to make their own western-style textiles, *Hu damask*. However, as Zhao shows, these Daqin people should probably be identified with Central Asian populations, which would indicate that there is archaeological evidence for the re-use of silk, but that it took place much further to the East than hitherto assumed.

The role of Central Asian people in the exchange of textile materials and technologies along the Silk Roads is also addressed by **Angela Sheng, McMaster University, Hamilton/Ontario**. Her contribution on **'Chinese silks that circulated among peoples north and west: implications for technological exchange in early times?'** goes to the heart of long-debated questions about the possibility of a transfer of weaving technology between the Graeco-Roman West and the Han Chinese East and the role of the peoples in between. At the workshop at the Mahindra Humanities Center, Sheng was originally respondent to the papers of Lillian Tseng, Zhao Feng and Irene Good, but kindly agreed to elaborate upon her thoughts on the late **Irene Good's** contribution **"From Han Silk to *Samitum* – early compound weaves and loom technologies in late pre-Islamic inner Asia"**. Because Irene was not able to attend the workshop and also sadly was unable to complete her contribution to this volume, her abstract is quoted here in the original:

Compound weaves are complex cloth structures associated with an advanced weaving apparatus, known as the drawloom. In the history of textiles, there are competing ideas on the origins of this advanced form of weave. One prevailing theory is that it developed exclusively in China (ca. 400 BCE), appearing first as warp-faced compound *tabby* and then as compound twills. Weft-faced compound weaves, made of wool, were then adopted in western Asia several centuries later. A competing theory reasons that compound weaves developed in the West and travelled East. A third theory posits they developed independently in China and the ancient Near East. This paper reviews the available evidence for early compound weaves in Eurasia, discusses the inferential problems involved, and suggests a resolution of apparently contradictory evidence.

In her role as respondent, Sheng's contribution first summarizes and comments on Tseng's paper, and thereafter appraises the key topics of the workshop. Sheng perceives cultural exchange between ancient Rome and China as an indirect one, relayed from region to region along the east-west Silk Road arteries, as also presented by Liu and Thomas. She says that the focus on silk highlights the significant role that intermediates played in this interaction, in particular the early inhabitants of the South Asian continent, as Kenoyer also argued and in keeping with Zhao's findings. She stresses that silk production and weaving cannot be understood without the vital input of the wool-making and wool-wearing pastoral nomads living on the expansive northern steppes (Sheng 2010) and the meaning of wool in the textile production in the Roman Empire (Wagner-Hasel 2015), factors of undeniable importance. Sheng then continues by unraveling the different arguments regarding whether any weaving technologies were transferred between the Roman Empire in the West and the Chinese Empire in the East in the early centuries. She appraises the role of the Tarim Basin kingdoms and Central Asia in general as a melting pot of weaving traditions both in terms of production of complex compound weaves and

in textile migration and trade. In particular, she addresses the influences on western wool taquetés that some believe were inspired by Chinese compound weave silks. However, Sheng argues that one has to take into consideration the dramatically different traditional loom systems of other regions and cultures, identifying the ‘double-weaves’ as being of primary significance in the exchange of weaving techniques along the Silk Roads. Instead of assuming a direct transfer of techniques, however, Sheng argues for the idea that a vertical loom like the *zilu* loom (or another vertical loom in one of the Western local traditions, as an experiment of a Norwegian weaver now shows, as seen in Chap. 8) was likely the kind of loom used to weave taqueté fabrics or weft-faced compound tabbies in Central Asia in the mid-first millennium CE.

Finally, **Robert Murowchick (Boston University)**, **Angela Sheng (McMaster University)** and **Kaoru Ueda (Boston University)** give a scholarly, but at the same time warm and appreciative presentation of the research of the late Irene Good that goes some way in filling the gap left by the contribution she would have made to the symposium and its publication. It draws attention to her very wide interests and skills in textile research, and in particular her contribution to studies of east-west cultural contacts in antiquity, for which she will be best remembered. This volume is dedicated to her.

Outlook

Future research on silk along the Silk Roads will include not only the whole range of textile production in the different areas and cultures along the Silk Roads and evaluate silk in relation to the huge background of other fibers, but also include scientific analyses of organic materials. We can now rely on the comparatively young discipline of textile archaeology that has rapidly evolved in the last decade and that investigates materials, dyestuffs, weaves and structures of ancient textiles both scientifically and historically.⁷ Moreover, with the help of microscopic examinations of spin directions and weaving structures, protein analyses, and the determination of strontium isotope composition of textile remains, we may soon be able to track down different species of silk moths, their origins and the regions where the raw materials were processed and woven. Karin Margarita Frei from the National Museum at Copenhagen and the Danish National Research Foundation’s Centre for Textile Research is now working on the strontium isotopic analyses of silk finds to determine the provenience of the raw materials, and the China National Silk Museum at Hangzhou under the direction of Zhao Feng is starting a project of mapping the Silk Roads through silk finds. The growing archaeological data will hopefully one day also allow us to distinguish between different stages of the production and embellishment of textiles that might have taken place in different cultural areas along the Silk Roads.⁸ Finally, a fresh look at our written sources may yield new insights into the paths of silks along the Silk Roads and the technological exchanges connected with them⁹ both in regards to terms for silk whose origins and meanings are yet to be found (see the contribution of Hyllested in this volume), and the interpretation of long-known texts like those that seem to refer to the unraveling of silks in the West (see the contributions of Liu and Zhao in this volume, and Hildebrandt 2012b). As Zhao has shown, the *Daqin* do not necessarily have to be equated with the Romans: they could as well have inhabited other regions “in the West” of the Chinese Empire in the same general way as the *Seres* from the Roman point of view refer to people in the East who were dealing with silk. Moreover, standard translations that often do not take due note of new archaeological and technical interpretations influence our way of thinking about the textiles involved. New translations might change our picture of intercultural exchanges. By joining forces with archaeologists, philologists, linguists, textile technicians, weavers and scientists from the Eastern and Western ends of the Silk Roads and the regions and countries in between, new chapters of exchange along the Silk Roads will be written.

Notes

- 1 I thank Beate Wagner-Hasel and Kasper Grønlund Evers (who kindly drew my attention to many new studies in the field) as well as Carole Gillis and the peer reviewers for their comments on this text.
- 2 My perspective is that of the Ancient Historian and Classical Archaeologist. It is beyond my capacity to summarize the Indian, Russian or Chinese points of view, for example, on the topic of research history on silk (for research on Chinese silks, though, see the extensive studies undertaken by the Silk Museum in Hangzhou and namely Zhao Feng and his contribution in Chap. 7 of this volume). I am convinced that a volume dedicated to the research history on silk in the different scholarly communities along the Silk Roads would yield as many new insights as research on the topic of silk itself, especially when conducted in a diachronic perspective.
- 3 <http://www.stanford.edu/~scheidel/acme.htm>.
- 4 It would be interesting to cross-culturally compare the discourses on luxury and silk along the Silk Roads.
- 5 See also the webpage of the Copenhagen Associations Project: <http://copenhagenassociations.saxo.ku.dk>.
- 6 Another question would be whether silk was also used and consumed by non-elite groups, and if so, under which circumstances.
- 7 Earlier 20th-century research had already shown an interest in textiles in general and silk in particular under the umbrella of technological studies, see Blümner 1912 and Forbes 1956, 2nd rev. ed. 1964. Researchers like Margarete Hald, Elizabeth Barber and John Peter Wild worked on textiles when materials like clay, stone or metal, which were more visible in the archaeological record, still dominated literature and university syllabi.
- 8 See, e.g., the example of the silk fragment from Palmyra with an embroidered flower. Parts of the embroidery are assumed to have been added by another hand: see Schmidt-Colinet and Stauffer, with al-As‘ad 2000 on a red silk with an embroidered flower from the tomb of Ehlabel in Palmyra (cat. no. 447), p. 175. See now also the discussion of Palmyrene embroidered silks in Evers 2016, 76, who suggests that the embroideries were “likely to increase their local market appeal and potential sales price.” Further studies will hopefully shed more light on possible economic, social and cultic meanings of textile decoration along the Silk Roads.
- 9 In a further step, these could be compared with other technological exchanges. For mural paintings along the Silk Roads, see, e.g., Yamauchi, Taniguchi and Uno (eds.) 2007.

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Looking towards the West – how the Chinese viewed the Romans

Liu Xinru

The Roman and Han Empires were roughly contemporaneous and accounted for about half the population on the Afro-Eurasian landmass during the first centuries CE. Given their importance and the Silk Road network that connected them, it seems strange that the two knew so little of one another. However, these two great empires were not only separated by mountains, oceans, and the vast steppe, but also distinctive cultures whose knowledge of each other was mediated by the equally distinctive and diverse communities between them. This paper explores how the Han Chinese came to learn about Rome and the nature of the information they obtained.

The Han emperors initiated trade missions to the west in an effort to find allies on the steppe to counter the threat of the Xiongnu nomads on their northern frontier. It is therefore a reasonable surmise that it was only after their envoys reached Afghanistan and India that the Chinese began to realize the existence of the Roman Empire. Alexander's expedition to the East during the late fourth century BCE resulted in the founding of several garrison cities named Alexandria. Through Zhang Qian's mission to the Yuezhi in Bactria in the late second century BCE, the Han Empire learned of the many oasis states around the Taklamakan Desert as well as those along the Amu and Syr Darya and the place name Alexandria soon entered the Chinese vocabulary. The earliest Chinese reference to the Hellenistic world was to a locale called Lixuan 黎軒. The etymology of this toponym has provoked much learned debate – among the many proposed solutions, Alexandria is the most likely choice (see also the general map for the empires, territories and major cities mentioned).

Lixuan first appears in the *Shiji* (History) of Sima Qian in discussing diplomatic exchanges between the Han Empire and the Parthians. Here the Parthian envoy who accompanied a Han mission back to China brought with him “eggs of big birds” and “magicians” (*huanren* 幻人或眩人) from Lixuan 黎軒 (Sima Qian 1962, 123/10/3172-73). The *huanren* here are presumably the magicians or magi associated with ancient Iran and the “big bird,” more than likely an ostrich. Taken together, this data indicates that this Alexandria was a Hellenistic city on the western edge of the Parthian Empire.

In the meantime, continued Roman expansion resulted in a Mediterranean-wide empire which included within its territory yet another Alexandria, the famed city on the delta of the Nile. This Alexandria became the chief entrepôt for the Empire's eastern trade. The “Roman” traders, more accurately Greek-speaking sailors and merchants from the eastern Mediterranean, traveled east by land and sea to obtain spices and silks. During the first century CE, the fame of this Alexandria reached the Kushan Empire. This is evidenced by the fact that

a crystal vase with Poseidon standing on top of the Lighthouse of Alexandria was discovered in Begram (Hackin 1939, figs. 37–40; Hackin 1954, figs. 359–363), the site of the Kushan city Kapisi, another of the Alexandrias in Afghanistan. Recently, the vase, with its representation of the famed Lighthouse, was reconstructed on the basis of the fragments. Information about these various Alexandrias, reaching China through the medium of several foreign languages, much perplexed court historians in the Later Han. The following passage from *Hanshu* (History of the Han Dynasty), compiled by Ban Gu during the mid-first century CE, exemplifies the confusion:

The King of Wuyishanli 乌弋山离 (Alexandria, according to Feng Chengjun), located as far as 12,300 *li* (Chinese miles) from Chang'an, is not under the Protectorate (that part of Central Asia under Han suzerainty). This is a great country in terms of population and military strength. Departing in a north-easterly direction, it takes 60 days to reach the headquarters of the Protectorate. Its eastern part borders on Jibin 罽宾 (Kashmir?); Putiao 扑挑 (Bactria?) is on its north; to its west are Lixuan (Alexandria) and Tiaozhi 条支 (Antioch?) (Ban Gu 1964: 96a/12/3888 (translation: Liu Xinru)).

Owing to variation in transliterations, Ban Gu, the author of the history of the *Former Han Dynasty*, did not realize that both Wuyishanli and Lixuan represent the name Alexandria. The distances provided by the *Hanshu* are hardly reliable measurements, but from the relative locations of the states mentioned, Wuyishanli should be identified with the Alexandria in Afghanistan, near Kandahar, and Lixuan with another Hellenistic city much farther to the west. As for Tiaozhi, it is most likely one of the Antiochs built by the Seleucid ruler Antiochus I, who, like Alexander, established a number of garrison cities bearing his own name. The fact that there was more than one Antioch to be found between the Mediterranean and Iranian plateau has further confused both ancient and modern scholars, who have been trying to locate Tiaozhi for more than half a century. Thus, even before the Roman Empire reached the lands of the eastern Mediterranean and its confrontation with the Parthians, Chinese envoys and scholars realized that there were a number of Hellenistic states and cities located beyond the imperial Protectorate of the Western Region.

Soon after the beginning of the Common Era, officials of the Later Han Dynasty gradually became aware that there was a country called Da Qin 大秦 (“Rome”), but initially identified it with Lijian 黎犍 (Fan Ye 1965, 88/10/2919). The origin of the former place name is vague, but it signals a change in the Chinese perception of the countries west of the Western Protectorate. Da Qin/Lijian was no longer just another Hellenistic city-state, but an empire similar to the Han in size and authority (Fan Ye 1965, 88/10/2919). It was during this time that Alexandria in Egypt became the center of Rome’s eastern trade, and the Indians, from their contact with Ionian Greeks, came to apply the name Yavana to the Romans. Given the fact that the Roman maritime trade with India and probably China was conducted by Greek speakers, it is hardly surprising that both Indians and Chinese viewed the Roman Empire as a continuation of the Hellenistic world they had encountered earlier.

This image was perpetuated in China through Buddhist texts that reached East Asia from India through the Hellenistic cultures of Bactria and Gandhara. In the *Milinda Punha* or *The Questions of King Milinda*, extant in a Sinhalese translation, the Greek King Menanda, the greatest of the many Indo-Greek rulers of the region, has a conversation with Nagasena, a Buddhist sage, in which he tells the latter he was born on an island called Alesanda, about two hundred leagues from Sagala where the conversation took place (Rhys Davids 1890, 127). In the Chinese version of the text, *Naxian Biqu Jing* 那先比丘经, the King tells the sage that he was from Da Qin, from a country (i.e., a city) called Alisan 阿荔散, which was 2000 *yoxun* or *yojana* (= 8–9 miles/c. 13–14.5 km) distant, or about 80,000 *li* (Zhang and Zhu (eds.) 2003a, 148). The Chinese translation probably appeared two or three centuries after the original Sanskrit text, which is now lost. The Sinhalese version is presumably closer to the Sanskrit original. Given the ambiguity of the measures of distance in the two texts, one can assume that the Alexandria in *Milinda Punha* was not too far from Bactria or Gandhara, where Sagala can be located, and is in consequence a city in Afghanistan, perhaps to be identified with modern

Kandahar. The Chinese version dramatically modified the distances involved to accommodate new information concerning the trade networks that had become available in the second or third century CE: thus, in this case, the Alexandria in question is most likely the port city on the Nile. The Roman Empire therefore entered the visual field of Han scholars as a political unit most closely associated with Hellenistic Alexandria.

At the height of the Roman Empire, fire-eaters and illusionists came from Da Qin to entertain and win the good will of the Chinese court (Fan Ye 1965, 88/10/2910). The *Hou Han Shu* makes reference to distant lands such as Mengqi 蒙奇 (Macedonia?) and Doule 兜勒 (likely Tokharistan, the country of the Tokharians), who sent envoys to the court of the Later Han (Fan Ye 1965, 86/10/2851). This information leads to several important conclusions. First, political and geographical entities in the backwater of the Roman Empire such as Mengqi or Macedonia sometimes presented themselves to the Han court as independent polities or at least as autonomous entities within Imperial Rome. Secondly, the name Doule or Tokharistan had replaced the older Greek designation, Bactria, for north Afghanistan, the center of the Kushan Empire, which adopted many Hellenistic cultural traits from its predecessors. Evidently, scholar-officials at the Later Han court continued to receive new information about the Western Region and beyond and updated their records accordingly, although they were sometimes confused by the different languages used in transmitting this information.

Through informal Buddhist information circuits, the Chinese were aware of some of the languages in the West, including the Greek that was in use in parts of Central Asia. *Yemeini* 耶寐尼 was the Chinese transliteration of Yavani, the Sanskrit word for Greek. The Chinese version of the Life of the Buddha, *Buddhacarita* by Ashvaghosha, *Fo Benxing Jijin* 佛本行集经, which appeared in the post-Han period, contains a lengthy list of the languages the young Buddha studied as a prince and Yemeini/Yavani is among them. The Sui Dynasty annotator of this text noted that Yameini is the language of the Romans and that Daqinshu 大秦书, literally “Roman writing”, designated their script (Zhang and Zhu 2003b, 187). This signifies that to the Chinese, Greek, not Latin, was the spoken and written language of Rome. This notion lasted into Tang times when Duan, in his *Youyang Zaizu* 酉阳杂俎, a volume of miscellaneous information, still used *Daqinshu* for “Roman”, i.e., for Greek writing (Fang (ed.) 1981 Duan Chengshi, 107). Moreover, by this time his usage was in full accord with the facts since now Greek-speaking Byzantium represented the Roman Empire to the Chinese. To conclude, most of the diplomatic contacts between the Later Han and “Rome” were actually with smaller Hellenistic polities to the east of the Roman Empire. And in cultural terms, it was the Greek populations, some well beyond their imperial frontiers, who most represented Rome to Han China.

In Chinese literature, the Roman Empire is portrayed as a rich country with its own productive sericulture. Among its many wonders were the magnificent glassware and beautiful woolen textiles so desired by Chinese elites. During the first century CE, the Silk Road reached the Roman Empire via land routes – from Parthia to Palmyra and the Levant, and by the sea route – from the ports of western India to the Red Sea and Egypt (Fan Ye 1965, 88/10/2919). The Kushans in Afghanistan and India were the principal intermediaries of this trade. Commodities from both the east and the west were found there and some Roman products, principally glassware, also reached China. The Kushans inscribed names of kings and gods in Greek letters on their coins, the major medium of exchange in this trade, to accommodate and reassure the many Roman commercial agents in their midst. The profound Hellenistic legacy in the lands between the Roman Empire and Han China operated as the primary cultural filter through which these two distant civilizations viewed each other.

Han China did not understand that the Romans wanted their silk since they assumed that Rome produced its own silk thread. The Romans could have had their own species of silk, albeit decidedly different from Chinese silk. Commercial information from the ports of western India filtered into the Han court, indicating that the Romans had such a pressing need for silk yarn that they unraveled plain silk textiles from China to obtain it (Wei Lue 1959, 30/3/861; Wang *et al.* (eds.) 1988 Du You, 193/5/5265). The confusing and contradictory information reaching China produced much speculation among historians of the Han era and

among modern scholars. Why did Rome want silk fibers if they could produce silk themselves? Furthermore, the kind of yarn obtained from unraveling textiles produced short fibers suitable only for heavy types of textiles such as tapestry. Did this kind of fiber meet the needs of the Roman market? Apparently not, since according to Pliny the Elder, Roman women greatly desired thin and translucent silk (Pliny, *Natural History* VI 20, 54).

The only plausible explanation for this confusion is that both the technical and commercial information had been filtered through so many intermediaries, each with its own cultural preferences, languages and economic interests, that the data became badly distorted in the process of transmission. Pliny, for example, knew so little about silk production that he called it a “woolen substance obtained from their forests” (Pliny, *Natural History* VI 20, 54 (translation: Rackham 1942, 379)). Nonetheless, wall paintings in Pompeii and Herculaneum verify Pliny’s claim that thin and translucent silk clothing was fashionable among women (*The Ancient Roman Civilization* 2003, 163, 165).

This leads us back to the previous questions. Why did Rome import so much rough yarn unraveled from plain silk textiles, when the actual domestic demand was for fine silk gauze woven with long filament yarn taken directly from silk cocoons? And why were Chinese officials so certain that the Romans produced fine silk textiles and silk yarn of their own? The answers to these questions are to be sought in the many Greek-speaking traders and dealers living in caravan cities and ports between the Roman heartland and China who were in a position to manipulate both the supply and demand in the growing pan-Eurasian silk market.

Roman subjects in the Levant started to produce silk with Chinese yarn or unraveled plain silk to make heavy types of textiles. Viewed from Chang’an and Luoyang, this region was thought of as Rome proper, an understandable misconception since from this outlying Roman province came all the gems, glass and fragrances that reached the Han court. In the eyes of the Han elite, such a great country not only had its own sericulture to produce silk yarn and textiles, such as colorful damasks, 杂色绫, but also exotic embroidery 刺金缕绣 and woolen tapestries, both of which were woven with gold thread 织成金缕罽 (Fan Ye 1965, 88/10/2919). The Han court was familiar with a great variety of textiles brought from different foreign countries and mistakenly attributed all of them to the Roman Empire. In point of fact, these textiles were a byproduct of a far-reaching industrial revolution in textile production made possible by exchanges of technology and materials that took place in the territories lying between the Roman Orient and the Western Protectorate of Han China. Woolen tapestry from looms of the Parthian Empire inspired weavers of Han China to transform silk weaving technology from warp-based patterning to using colored weft threads to create large patterns and wider textiles. Meanwhile, weavers in the Levant were inspired to create brocade and tapestry, both heavy types of silk textiles using large quantities of yarn, not necessarily of the long filament type. The revolution took several centuries, resulting in the magnificent Byzantine and Tang silk textiles that became the symbols of ruling elites across Eurasia.

However, before the new products from the cultural exchange became available in the Eurasian market, what kinds of silk did the Romans in Italy purchase from Han China when silks first reached them? What kind of textiles did the Romans use in exchange to satisfy the tastes of the Han elite? The translucent and light silk textiles were produced in China long before the Silk Road brought silks to the west. Loose but sophisticated weaving with twisted and twined threads produced translucent gauze called *luo* 罗 and *sha* 纱. In the tombs of Mawangdui, Changsha, dated to the early Han Dynasty (second century BCE), several fragments of silk gauze have survived. However, no such light silk gauze is known from sites in Central Asia or along any of the branches of the Silk Road, or at least, none is registered in the available catalogues. It could be that the more colorful, eye-catching silk brocades and tapestries are the ones collected and cataloged by museums. And, in contrast, gauze silk, beautiful when newly made, tends to decay and disintegrate with age. I was therefore surprised in searching through my files to find an image of silk gauze among a group of silk textiles dated to the Han times, presumably from sites in Mongolia (this group of textile fragments was in the collection of the

Nomads on the Mongolian steppe were important carriers of silk textiles from Han China to the west and this silk gauze provides material evidence that the Han textiles most desired in Roman Italy were available in the Eurasian exchange network at this time. My friend and colleague Angela Sheng points out that both the Mawangdui and Mongolian samples of gauze silk were woven in a lozenge pattern, which is not evident in Roman mural art. Therefore, I cannot stretch the evidence to demonstrate that this kind of gauze silk reached the Roman market. All that may be securely stated is that exports from the Han Empire included fine silk gauze. Further west at Palmyra, on the eastern frontier of Rome, many textile fragments have been discovered. The colored silk brocade, tapestry and damask attest that the prestigious, heavy-type silk textiles from Han China actually reached the Roman orient. No silk gauze is seen in the catalogue of the textiles from Palmyra. A piece of gauze woven with a mixture of silk and woolen thread suggests, however, an intriguing hypothesis: some of the weavers from the lands between the Levant and the Western Protectorate created this material with long, silk filament thread, which was in short supply, in combination with the more abundant high-quality woolen yarn to meet the demand of the market in Roman Italy (Schmidt-Colinet and Stauffer, with al-As'ad 2000, 183, cat. 490, pl. 74 c). There are many textile fragments using both silk and woolen thread in the Palmyra collection, and the piece of gauze represents only one of the new products emerging from this exchange of materials and technology. It appears that the artisans and dealers of textiles of this period were creative and imaginative in making textiles of high aesthetic value that met the demands of affluent customers from different cultures and countries.

On the eastern end of these technological exchanges and commercial transactions, the historian Ban Gu nicely represents the desire of the Later Han elite for prestige goods from the lands to the west. His correspondence with his brother Ban Chao clearly reveals their intense interest in these Western textiles. Since Ban Chao was the chief architect of the Later Han Western Protectorate, who in alliance with rulers and traders of the oasis states made the routes to the west safe for commerce, he was well positioned to satisfy his brother's desire for horses, fragrance and textiles. In one transaction, he purchased, on behalf of his brother, about ten pieces of multi-colored woolen tapestry 杂罽 *zaiji* for 800,000 coins. In another letter, Ban Gu asked for exquisitely made rugs *tadeng* 氍[毛登] from the Yuezhi, i.e., the Kushan Empire (Yan Guojun 1930, 25/3-4). While Later Han scholars assumed that the Romans produced fancy silk textiles, what they really desired from the Romans were woolen textiles, especially rugs and tapestry. Woolen tapestry 罽 was a prestigious textile in China and together with brocade and embroidery was included in sumptuary laws which imposed severe restrictions on merchants' dress in Han times (Ban Gu 1964, 1a/1/65). Tapestry and rugs were also in high demand in court circles as floor and wall coverings (Wang Zinian 1959, 1590-91). The post-Han author of the *Wei Lue*, when confronted with the information that the Romans unraveled plain silk from China to make textiles, was less certain about their weaving material:

The fine cloth is said to be woven from the wool of water sheep ... all the six domesticated animals in that country were aquatic. However, there is a saying that not all the textiles were from this kind of wool, and the material could be made from tree bark or silk yarn from wild silk worms. The material makes good rugs and tapestry. (Chen Shou 1959, 30/3/861 (translation: Liu Xinru))

His description of Roman textile materials is as vague as Pliny's knowledge of the silk of China. Nevertheless, some of his statements are accurate, confirmed by the finds of textiles in the Han Western Protectorate.

Skillfully designed woolen tapestry and rugs have been found in various Central Asian sites with increasing frequency. A portrait of the Greek god Hermes on a recovered tapestry is strikingly similar in style to portraits found in Roman wall paintings and mosaics (Stein collection in the National Museum, New Delhi, L.C. iii. 010a; see also the cover of this volume). In these finds, the decorations on woolen tapestries and hanging rugs are dominated by Dionysian and Bacchanalian motifs (see also Fig. 8.14 in Angela Sheng's

contribution). A woolen tapestry, excavated at Niya on the southern rim of the Taklamakan, is decorated with grapes and a human head, which probably forms the upper body of a centaur (Huang 1985, pl. 98, 110). A woolen hanging excavated at Shanpula Cemetery, Luopu County, Xingjiang, also dating to Han times, depicts both a centaur and a soldier (Ma and Yue (eds.), 1998, pl. 65, 153) (Fig. 1.1). The strong aesthetic appeal of the woolen tapestry most certainly inspired the demands of Ban Gu and other Han elites. The Dionysian motifs, too, direct the search for the provenance of these goods to the Greek-speaking Roman Orient.



Fig. 1.1: Wool fragment with a centaur and a warrior. From Sampula, Tomb 1 of Cemetery 1, Han Dynasty (© Xinjiang Uyghur Autonomous Region Museum Collection. By kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).

Finally, it is highly likely that the many Hellenized and partially Hellenized cities east of the Levant and west of the Jade Gate were the chief centers of innovation responsible for these new styles of tapestry and wall hangings, whether woven of wool, silk or of combinations of the two. The exquisitely crafted Yuezhi rugs so desired by Ban Gu may have been made in the Kushan Empire or purchased from the producers farther west by

Kushan dealers. Han envoys did not venture beyond Tiaozi or Antioch in Parthia, thus their knowledge of the region beyond the Western Region Protectorate relied heavily on the movement of commercial information along the Silk Road. For the Han court, this flow provided new knowledge as well as considerable misunderstanding about the Roman Empire, the Great Qin of the Chinese historical records.

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Textiles and trade in South Asia during the Proto-Historic and Early Historic Period

J. Mark Kenoyer

This paper will present a critical overview of trade connections between South Asia and the West between 2600 BC and 300 AD. Special focus will be placed on the production of fine textiles including cotton, wool and silk that may have been produced for use by local elites as well as for external trade. The earliest trade connections between the Indus Valley and West Asia began with overland and marine trade during the period of the Indus Civilization, c. 2600–1900 BC. The subsequent periods of intensive exchange include the periods of the Mauryan and Kushana Empires, dating between 300 BC to around 300 AD. Special attention will be paid to textual evidence for the production and trade of fibers and textiles during this time period and the evidence for linkages with the Mediterranean and later Roman world.

The vast subcontinent of South Asia stretches from the borders of Burma and Southwestern China in the East to the Iranian Plateau in the west, from the Himalayan Mountains in the north to the southern tip of Sri Lanka in the south (Schwartzberg 1992). It is a region that has a wide range of resources that have contributed to the development of textile production and technology since early Prehistory, from the spinning and weaving of different types of fibers to dyes and other decorative components of textiles. The earliest production of textiles in South Asia was primarily for internal use but over time, local textile production came to play an important role in trade to adjacent regions and for long-distance trade. This paper will present the earliest archaeological evidence for the use of plant and animal fibers and woven textiles during the Proto-Historic Period of the Indus Tradition (Kenoyer 2004). It will also present the current information that is available on the production, use and trade of textiles during the Early Historic Period, particularly during the Mauryan and Kushana Empires (c. 300 BC–300 AD) when we have limited archaeological evidence and various categories of textual evidence for textile production and trade (Singh, K. 1994; Gopal 1961).

The Indus Tradition refers to the long-term cultural trajectories that begin to take shape with hunting and foraging communities who were living in various parts of the Indus River Valley more than 10,000 years ago. By 7000 BC, settled agro-pastoral communities were established and between 5500–2800 BC we see the development of regional cultures that constituted the foundation for later urban society. The earliest incipient urban centers can be dated to between 2800–2600 BC, followed by full urbanism that is often called the Indus Civilization. From around 2600–1900 BC, large walled cities and surrounding smaller settlements represent the earliest phase of urban development in the northwestern subcontinent, in what is now Pakistan and western

India (Fig. 2.1, Table 2.1) (Kenoyer 1998; Kenoyer 2011a).

The core regions of the Indus Tradition are situated in the northwestern subcontinent along the Indus River and its tributaries, as well as the parallel but now dry river system referred to as the Saraswati-Ghaggar-Hakra-Nara River. The use of fibers made from animal wool, cotton, and other plant fibers such as hemp and possibly nettle can be traced to prehistoric communities of early farmers and herders who lived and traded from the highlands of Balochistan and Afghanistan, to the Indus and Ghaggar-Hakra Rivers and their tributaries more than 9000 years ago (Fig. 2.1). Over several thousand years small villages and eventually larger settlements and towns were established in Balochistan and throughout the vast alluvial plains. During these initial phases, evidence for fibers and textiles is based on very fragmentary evidence of baskets, beaded ornaments such as necklaces and anklets, fabric impressions left in clay, and in rare cases, fibers preserved by metallic salts (Moulherat *et al.* 2002). Eventually, with the rise of early urban centers at around 2800 BC (Kot Diji Period), evidence for textiles is seen in the clothing depicted on terracotta human figurines, some of which have painted designs that indicate decorative patterns that were woven or applied to fabrics.

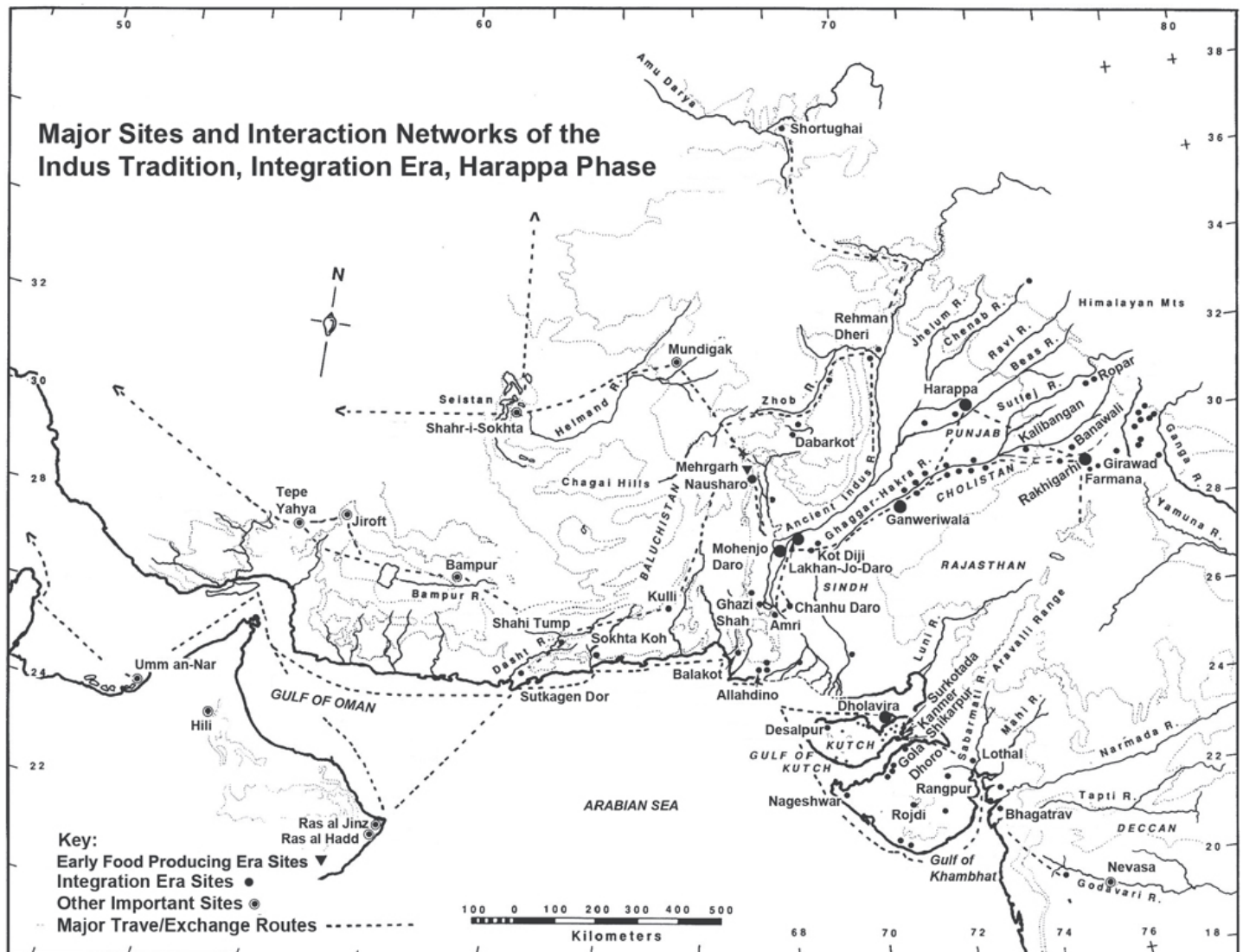


Fig. 2.1: Map of the Indus Tradition and other major sites (drawing: the author).

Table 2.1: *Indus Tradition*

Foraging Era	Mesolithic and Microlithic	10,000–2000 BCE
Early Food- Producing Era	Mehrgarh Phase	7000–5500 BCE
Regionalization Era	Early Harappan Phases	5500–2600 BCE
Integration Era	Harappan Phase	2600–1900 BCE
Localization Era	Late Harappan Phases	1900–1300 BCE

(compiled by the author)

Increased physical evidence for textiles is found in the subsequent Harappan Period (2600–1900 BC) where rare traces of fibers and textiles have been preserved through various preservation processes (Kenoyer 1998). Fibers and tassels were used in copper/bronze ornaments, and some bronze objects were wrapped in textiles prior to storage in the home or inadvertent burial. In the process of metal corrosion, copper salts replace the organic components of the fibers and in some cases the fibers themselves appear to be preserved as if they were “pickled”. In other cases, fibers have been charred or sealed under a thin clay slip on pottery. Fabric impressions on pottery or faience vessels are an additional source of evidence for different types of weaving and spinning. In addition, indirect evidence for textiles is seen in graphic depictions on seals and painted pottery, as well as many different styles of terracotta figurines. Animals such as the unicorn that is depicted on seals are often shown with what may be a coverlet draped over the forelegs (Kenoyer 2013). Male and female human figurines and sculptures reveal the use of shawls, skirts, trousers, turbans, and head dresses for both men and women. Toy beds were decorated with fabric impressions and designs to suggest the use of bed sheets and various decorated fabrics.

The most common fiber used during the Harappan period appears to have been cotton, but various types of wool as well as jute or hemp fibers were also used. The discovery of silk thread inside copper beads and a copper bangle from the site of Harappa indicates that wild silk was also known and used by the ancient inhabitants of the region. Silk fibers have also been recovered from the site of Chanhudaro preserved inside steatite beads that were stored on a copper dish (Good *et al.* 2009; 2011). Until recently it was thought that Indus silk was used only as a thread for ornaments, but as will be discussed in more detail below, the analysis of a piece of woven fabric preserved on a copper razor from Harappa indicates that silk was also used to weave fabrics.

During the Harappan Period, settlers and traders from the Indus Valley expanded into the northern parts of Afghanistan and Central Asia (Turkmenistan) and there is also evidence for trade contact between the Indus, the Persian/Arabian Gulf region, Iran and Mesopotamia (Ratnagar 1981; Kenoyer 2008). It is not unlikely that textiles produced in the Indus region were traded to Central Asia and Iran as well as to regions further to the

west in Mesopotamia. These textiles would have included cotton and silk, which were produced exclusively in the Indus at this time period, as well as specific types of wool and bast fibers such as hemp and jute. These early Indus contacts set the stage for later trade networks that were developed during the Early Historic Period (c. 800 BC–300 AD).

During the Early Historical Period of South Asia (c. 600 BC–300 AD), most of the evidence for the use of textiles comes from references in classical texts and inscriptions, or from the depictions of textiles in sculptures or paintings (Singh, K. 1994). The textual references from South Asia include the *Vedas*, the *Mahabharata*, *Ramayana*, and *Puranas*, as well as the later Buddhist and Jain texts. In addition there are references to textiles from South Asia in Chinese texts, such as the accounts of Sima Qian during the Han Dynasty, and later travel texts of Buddhist pilgrims during the fourth and fifth centuries AD (Gopal 1961). The Western textual sources include references to the textiles of South Asia in Biblical, Greek, and Roman texts (Barber 1991; Parker 2008). Up until now, scholars have generally disregarded the South Asian texts, but have taken the Western texts as true representations of the types of textiles produced and traded in antiquity. However, as will be discussed in more detail below, the archaeological evidence from the Indus civilization and adjacent regions suggests that these texts need to be reviewed more critically. This is particularly important when looking at the terms for silk and the association of silk textile production with the core regions of China. While there is no question that South Asia was a major producer of cotton textiles of both coarse and fine quality, there is clear textual evidence that this region also produced various qualities of silk fabric using both local wild silk moths and Chinese-derived silk moths (Gopal 1961). A detailed discussion of the nature of the evidence during each major period and new directions for research will be presented below.

Earliest evidence for textiles in South Asia

The earliest evidence for the preparation of fine fibers in South Asia is indirect, and comes from the discovery of tiny ostrich eggshell beads dating to the Upper Palaeolithic, more than 10,000–20,000 years ago (Francis 1997; Sali 1989). These beads would have been strung on finely twisted fiber that could have been made from a variety of plant or animal fibers. The importance of these beads is that people were making fine fibers that were strong enough to hold tiny beads in composite ornaments, and that people in this region probably continued to produce a variety of fibers for thousands of years prior to the eventual indigenous development of more complex forms of spinning and weaving.

The role of fibers in ornaments is better documented from the excavations in the pre-ceramic Neolithic levels at the site of Mehrgarh, Pakistan (Fig. 2.1) (Jarrige and Lechevallier 1979). This site is located in the Kachi Plain along the Bolan River at the western edge of the Indus Valley. The site has evidence of small houses made of mud-brick, and numerous burials that date from between 7000–5500 BC. From the very beginning of the habitation there is evidence that the inhabitants practiced wheat and barley farming as well as sheep and goat and cattle herding. Their subsistence was supplemented by hunting, fishing and gathering wild fruits. The site was also probably a major crossroads for communities migrating between the highlands and the plains.

Although the early settlers at Mehrgarh did not produce fired clay pottery vessels, they made unfired clay figurines (Jarrige, C. 2008) and also produced baskets from reeds or processed plant fibers that were coated with bitumen (Samzun and Sellier 1985). In addition, they traded for exotic beads of marine shell and various types of stones, such as lapis lazuli, turquoise and steatite. The tiny beads found woven into wide headbands must have been threaded with strong fibers derived from either plants or animals (Kenoyer 2004).

The only fiber that can be confirmed for the Neolithic period is cotton. Mineralized cotton fibers have been preserved in rare examples of hammered native copper beads recovered from two different burials

(Moulherat *et al.* 2002). The beads were strung with a loosely twisted thread but the nature of the twist was not determined. The copper oxides from the corroded metal preserved the fibers so that it was possible for the researchers to determine that they were from the cotton plant and not some other vegetal material. Earlier studies of charred seeds had already identified the presence of cotton *Gossypium* sp. at the site at around 5000 BC (Costantini 1984), but it was unclear whether the seeds were collected for their oil or whether the cotton fiber was also being processed. The presence of cotton seeds in an area that also had evidence for possible hide production led the excavators to suggest that it might have been an indication of cotton cloth production (Jarrige *et al.* 1995, 67) though at the time of publication they had not yet discovered the fibers in the copper beads.

Although it is not possible to differentiate the two types of Old World cotton morphologically from charred remains or fibers, the most likely candidate for the cotton at Mehrgarh is *Gossypium arboreum* L. or Tree Cotton (Moulherat *et al.* 2002; Fuller 2008). The use of cotton during the Neolithic at Mehrgarh needs further study, as it is not clear whether it was collected wild or was being cultivated. A wild form of *G. arboreum* is reported from Southern Sindh and also from the dry hills of the Central Deccan, but “... the modern distribution may not represent primary habitat as feral varieties may have spread together with the early cultivar” (Fuller 2008, 3). Wild examples of the other Old World species, *G. herbaceum*, are known only from South Africa and although there are reports of prehistoric cotton from sites in Arabia and Nubia, “There is no evidence that these early finds in Arabia or Nubia relate to early cultivation, and evidence for cultivation in Africa only begins from the Early Historic horizon (broadly speaking, the Roman period)” (Fuller 2008, 4). In addition to cotton, the ancient inhabitants of Mehrgarh also had domestic sheep and goats (Meadow 1998), so we can assume that wool was commonly used in the preparation of cordage, yarn and various types of textiles.

Evidence for the spinning and weaving of textiles at Mehrgarh is represented by spindle whorls made from stone (Jarrige *et al.* 1995, 188), and polished rib bones and needles may have been used in weaving and sewing (Jarrige *et al.* 1995, 188, 369, 514). A study of the bone tools from the various periods has shown that polished rib bones are found first in the pre-ceramic Neolithic and increase during the subsequent Chalcolithic period when pottery making becomes widely practised (Russell 1995). Some of the bone tools have been linked to pottery making due to their discovery in a pottery workshop but others may have been used for weaving. Ongoing experimental studies of bone tools at the site of Harappa by the author have shown that the nature of the polish on the bone tools used in pottery making is distinct from those used in the production of fabrics, and that the highly polished bone tools at Harappa and also at Mehrgarh may have been associated with weaving rather than pottery making.

A residual impression of what appears to be a fragment of black- and red-colored woven textile was found in one of the Neolithic burials at Mehrgarh (Jarrige *et al.* 1995, 211, 223 fig. 4.5c). This discovery may indicate that some of the textiles were either dyed or painted with pigments. Black color could be the result of a carbonized vegetable dye such as indigo blue or red madder, or a blackened iron oxide pigment. There is considerable evidence for the use of red ochre in the burials at Mehrgarh and in various domestic areas of the site (Jarrige *et al.* 1995), so the red color may have been derived from ochre, which is also a form of iron oxide.

Although the evidence of textiles from the earliest period at Mehrgarh is quite fragmentary, there is concrete evidence for the early use of cotton fibers for stringing ornaments, and for the early indications of woven textiles, even though the type of textile is still not confirmed.

Indus Tradition textiles

During the Regionalization Era (5500–2600 BC) of the Indus Tradition, there is increasing evidence for the

production of textiles and dyeing based on impressions found in clay ornaments, spindle whorls, bone weaving tools, and representations of patterned fabrics painted onto fired terracotta figurines. At the site of Harappa during the Ravi Phase occupation (3900–2800 BC), spindle whorls have been discovered that fall roughly into two different weight categories (Kenoyer 2010b). The sample size for complete spindle whorls is small ($n=6$), and the two sizes average 16.6 g and 28.4 g. During the subsequent Kot Diji Phase (2800–2600 BC), there are four categories of weights with the two larger categories being roughly the same as those seen during the Ravi phase, at 23.13 g and 30.46 g ($n=7$). Two smaller categories of spindle whorls could indicate the production of finer threads but the sample size for complete whorls is not very large ($n=4$) (Kenoyer 2010b). Overall, the spindle whorls indicate that both fine- and coarse-weight threads were being spun, but it is not known what fibers were being spun. The region around ancient Harappa was suitable for growing cotton, hemp and other plants that could produce bast fibers, and also had excellent grazing for sheep and goats, so the fibers being used could have come from a wide range of vegetable or animal sources.

Two small terracotta beads with impressions of loosely woven, simple weave fabrics with what appear to be S-twist threads have been discovered from the Ravi levels at Harappa (Fig. 2.2). Although the impressions are somewhat faint, it is possible to note that the fabric was loosely woven with approximately 11 threads per centimeter and that the threads were less than 0.2 mm thick. Weaving could have been done on a back strap loom or a more complex form but so far no loom weights have been found in the Ravi Phase deposits. There are however numerous bone tools, generally made from bovine ribs that have a high polish that may be linked to weaving. A small piece of bone with multiple holes drilled into it could possibly have been used as a card-weaving tool for making narrow belts (Kenoyer 2011b). Future replicative studies will be undertaken to determine the type of design that might have been produced by such a tool.



Fig. 2.2: Terracotta bead with textile impression, Ravi Phase, Harappa (photo: the author, courtesy of the Harappa Archaeological Research Project and the Department of Archaeology and Museums, Government of Pakistan).



Fig. 2.3: Terracotta figurines, Nausharo (courtesy of J.-F. Jarrige and the Department of Archaeology and Museums, Government of Pakistan).

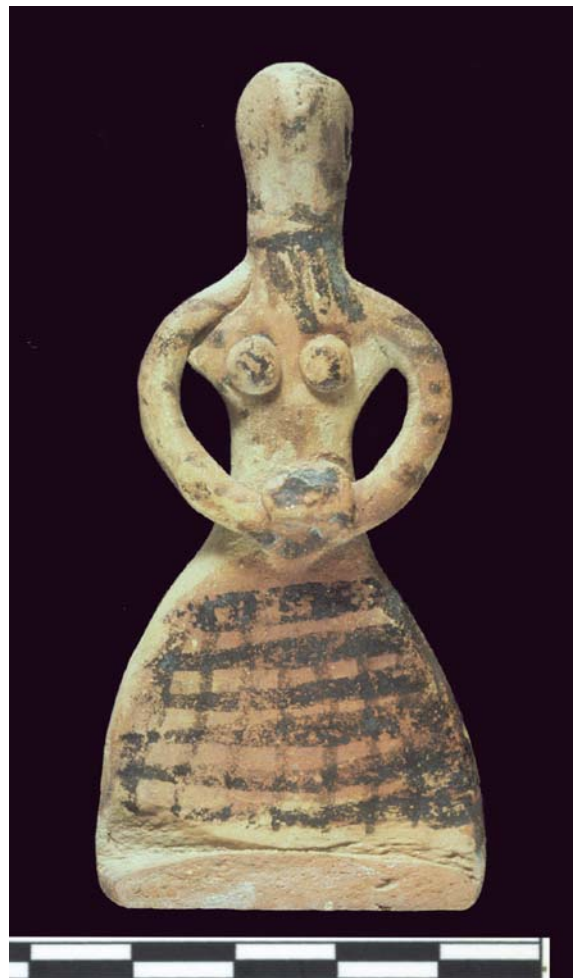


Fig. 2.4: Terracotta figurine, Harappa, 2800–2600 BC (photo: the author, courtesy of the Harappa Archaeological Research Project and the Department of Archaeology and Museums, Government of Pakistan).

At the sites of Mehrgarh an Nausharo, numerous terracotta figurines have been recovered from this same general time period that show the use of a variety of textiles (Jarrige, C. 2008; Kenoyer 2004; 2006a). Many of

the female figurines are depicted with elaborate headdresses and necklaces, while the male figurines have turbans or caps, and necklaces. In addition, many of the figurines have what appear to be leg coverings that would have been sewn (Fig. 2.3). At Harappa, a terracotta female figurine dating to the Kot Diji Period (2800–2600 BC) is depicted in what appears to be a full-length skirt made of a fabric woven with two alternating colors in the warp and the weft (Fig. 2.4). This pattern is common in the region today where indigo-dyed blue yarn alternates with natural brown cotton or bleached cotton (Kenoyer 2004). Many of the textiles were probably decorated with beadwork and sequins as well as various types of buttons. During this time period gold sequins have been discovered for the first time, as well as geometric button seals of fired steatite and bone with holes that could have been used for stringing or to attach them to fabrics. In addition to the depictions of textiles on human figurines, some of the terracotta bull figurines from Harappa and other sites are painted with geometric designs that might indicate the use of some form of textile blankets. Today in Pakistan and India, cattle are often decorated with quilted textiles, which serve as ornamentation as well as protection from cold weather (Kenoyer 2004).



Fig. 2.5: Terracotta female figurine, Mohenjo-Daro, National Museum, Karachi (photo: the author, courtesy of the Department of Archaeology and Museums, Government of Pakistan).



Fig. 2.6: “Priest-King” sculpture, Mohenjo-Daro, National Museum, Karachi (photo: the author, courtesy of the Department of Archaeology and Museums, Government of Pakistan).

During the Indus Integration Era (2600–1900 BC), major cities were established throughout the Indus River Valley and adjacent regions (Fig. 2.1) (Kenoyer 1998; Possehl 2002). These cities were highly organized with well laid-out neighborhoods, north-south and east-west streets, wells, bathing areas and latrines, as well as some large public structures and craft production areas. The Indus people used a form of writing that is found on seals and inscribed on pottery as well as other items (Kenoyer and Meadow 2010). However, the Indus script has not yet been deciphered and we can use archaeological data only to interpret the nature of their society and the types of crafts and trade that they engaged in. All major settlements were surrounded by massive perimeter walls with brick or stone-built gateways. A wide range of crafts including copper working, stone bead making, shell working, etc., was practiced inside the areas enclosed by the city walls. The presence of some spindle whorls and lots of copper rods/spindles suggest that fibers were being spun inside the city using both drop spindles and hand-turned spinning wheels (Kenoyer 2004). Further studies are needed to confirm the presence of hand-turned spinning wheels (also called spindle wheels by some authors (Baines 1977)), but the significant decline of clay spindle whorls during the Harappan Phase suggests that some other process was being used to spin thread. Grooved stones and fired clay objects have been identified as possible loom weights, so it is thought that some textiles may have been produced within the walled cities. It is also possible that textiles were woven in rural settlements and brought to the cities, but this is something that needs further research. Regardless of where the textiles were produced, it is not unlikely that textile production and trade were used to support the urban economy as has been documented through textual evidence from contemporaneous cities in Mesopotamia (Wright 2008; Moorey 1985) and Egypt (Lucas 1962; Nicholson and Shaw 2000). Evidence for the use of different types of textiles is found indirectly from the depictions of

clothing and turbans on figurines and sculptures, as well as from rare examples of preserved fibers and fabrics (Kenoyer 1998).

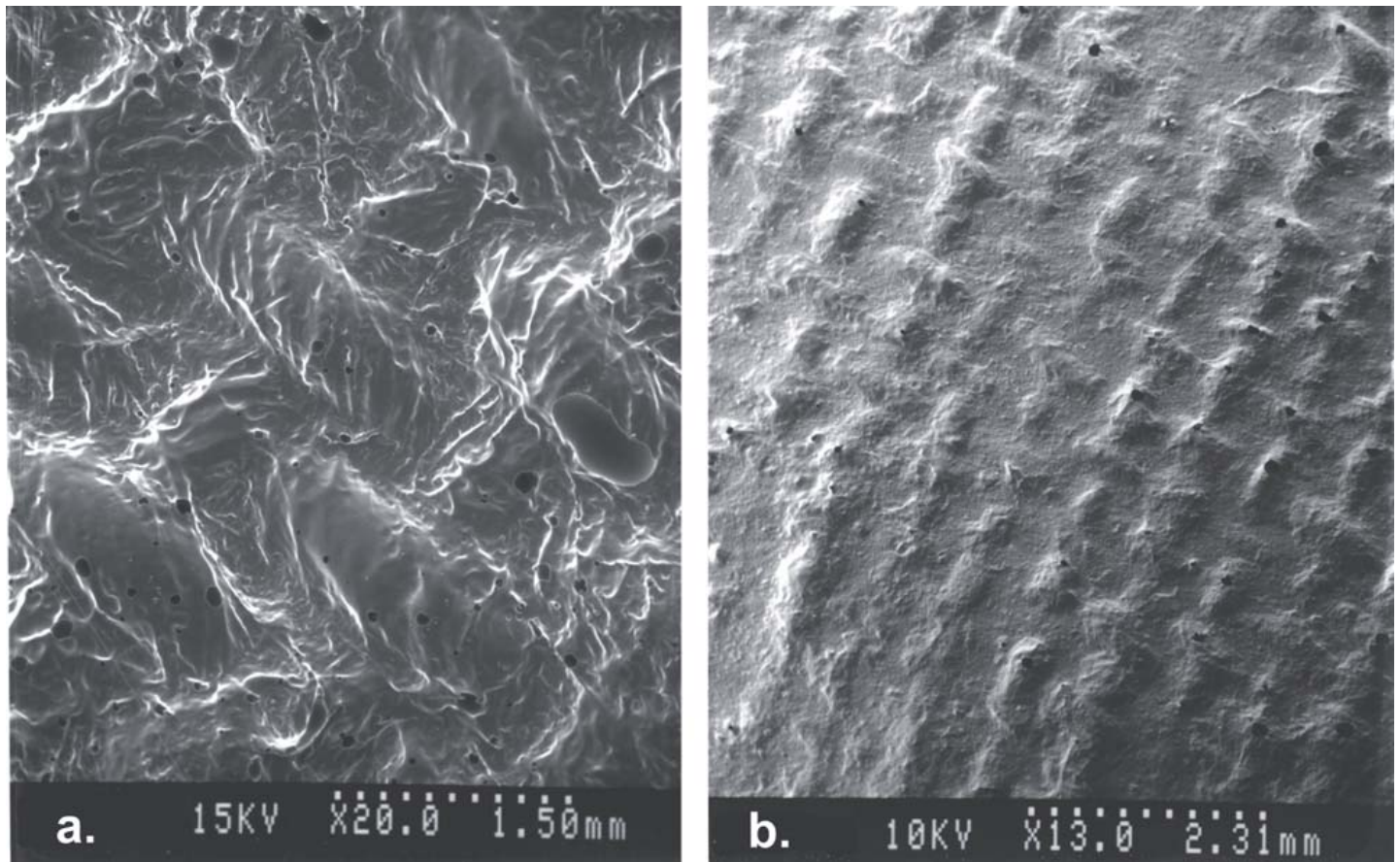


Fig. 2.7: Fabric impressions inside faience vessels, Harappa (a: H99/8939-1, b: H98-3551/8159-15) (photo: the author, courtesy of the Harappa Archaeological Research Project and Department of Archaeology and Museums, Government of Pakistan).

Terracotta figurines from the sites of Mohenjo-Daro (Marshall 1931, 338, pl. xciv, 14) (Fig. 2.5) and Harappa as well as other major Indus sites provide evidence for the use of many different types of clothing made from woven textiles (Kenoyer 1991). Unlike the long skirts of the Kot Diji-Period figurines, the Harappa-phase female figurines are usually depicted with short skirts and no upper garment. Some females and some figures depicted in a procession on a carved steatite seal are shown with long skirts that reach to the middle of the calf. While many male figurines are depicted nude, some wear long skirts, while others have only narrow loincloths. The elaborate headdresses of many female figurines may have been made using textiles as they have many different shapes that cannot be made using human hair only. Headdresses for male figures include pointed conical headdresses, turbans, and horned hats that may have been made with fabric or basketry (Kenoyer 1991; Clark 2007; 2008).

Most of these figurines might have been painted, but the pigments have been lost. However, one stone sculpture from Mohenjo-Daro was found with pigment still adhering to the carved designs on a cloak (Marshall 1931, 356–357, pl. xcvi). This figure is often referred to as the “Priest-King”, and had a cloak decorated with carved circles, double circles and trefoil motifs thrown over his left shoulder (Fig. 2.6). When first discovered, the carved designs were filled with red pigment in the circular areas and a background filled with some dark pigment that may have been green or blue originally. The white color of the original stone was visible in the outlines of the circular motifs, presenting a colorful pattern of red, white and blue/green. In later periods of South Asian textile production and even today, indigo blue, red madder, and bleached white textiles are combined to produce outstanding patterns using block printing as well as other forms of coloring. The design on the cloak of the ancient sculpture may represent a form of embroidery, appliqué, or tie dyeing, but most

likely not block printing since the pattern is not repetitive (Kenoyer 2004).



Fig. 2.8: Terracotta toy bed model with fabric impression, Harappa (photo: the author, courtesy of the Harappa Archaeological Research Project and Department of Archaeology and Museums, Government of Pakistan).

Textile impressions and preserved fibers

In addition to indirect evidence, there are numerous impressions of woven textiles that provide concrete evidence for the use of simple weaves and both fine and coarse fibers. The most common form of textile impression is found on the interior of hollow faience vessels and though Vats (1940, 466) suggests that the fabric is cotton, ongoing studies of similar vessels found in more recent excavations at Harappa suggest that many different types of fabrics might have been used. These vessels were made by forming the plastic faience paste around a small ball made of cloth that was then removed after the faience was dry, or burned out during the firing of the faience. Some of the fabrics were made with fine threads and tight weave (Fig. 2.7a), while others had fine threads and an open weave like gauze. A few examples show large, unevenly spun threads and irregular weave (Fig. 2.7b). While the former textiles could represent fine cotton or even wool, the latter might represent a form of hemp or jute fabric. The variation in textiles in these examples suggest that the faience workers had access to many different qualities of textile and used whatever scraps were available to them (Kenoyer 2004). Several examples of toy beds made of terracotta with fabric impressions on the upper surface have been found at Harappa. A study of the impressions shows that the simple-weave fabrics were made with threads of uniform thickness that demonstrate the high level of skill of Harappan spinners and weavers (Fig. 2.8).

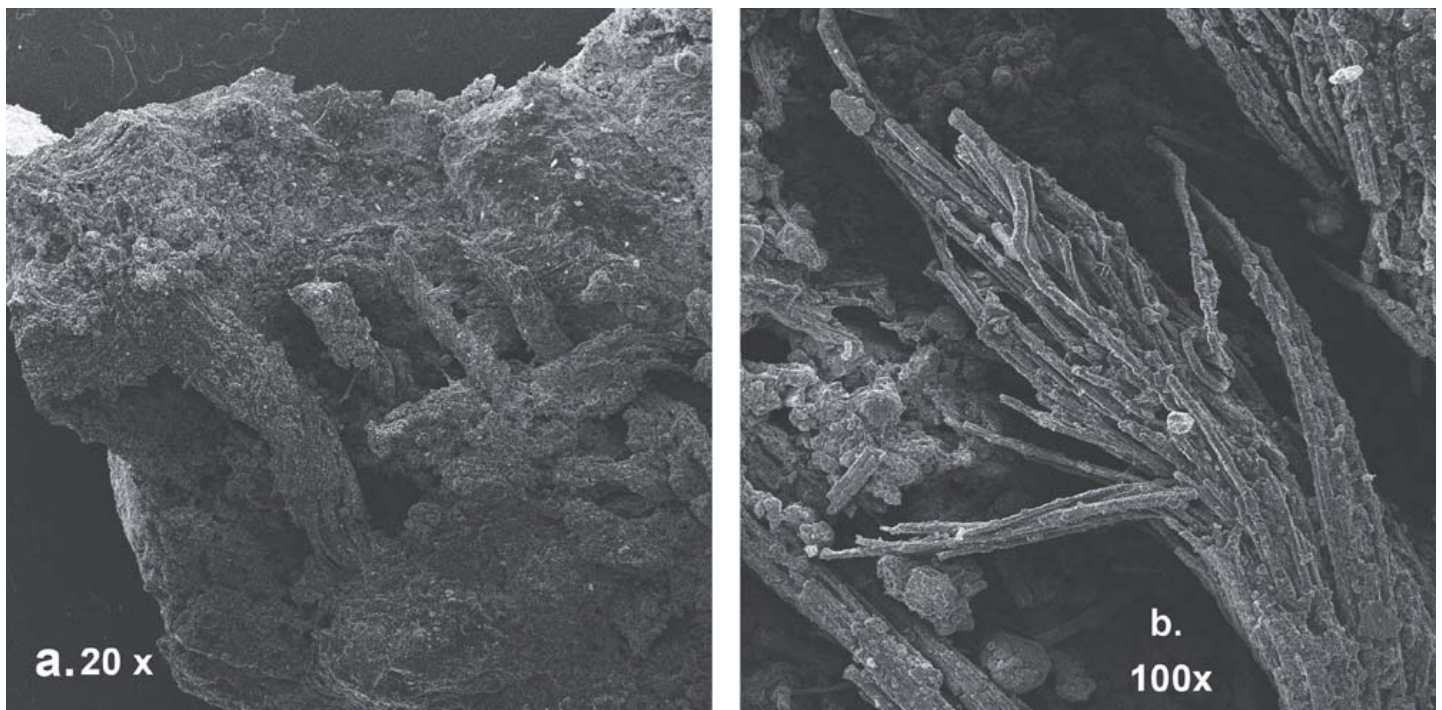


Fig. 2.9: Cotton fiber from Harappa (H2000/ 2114-73), SEM image (photo: the author, courtesy of the Harappa Archaeological Research Project and Department of Archaeology and Museums, Government of Pakistan).

These various examples in faience and terracotta indicate that the spinning was done carefully to avoid producing threads that had variable thickness. There is a dramatic decline in spindle whorls during the Harappa Phase, suggesting a different technology for spinning. While relatively uniform spinning is possible using drop spindles, it is easier to produce fine threads using a spinning wheel. The initial preparation of the fibers by carding or bowing does not leave a trace in the archaeological record, but there are numerous pointed copper rods that could have been used as spindles on a spinning wheel. Traditional spinning wheels in Pakistan and India today are made almost entirely of wood and string, except for the metal spindle that is used to help spin and collect the thread. Some textile historians seem to think that the spinning wheel was introduced quite late into South Asia, even as late as the fourteenth century (Riello and Parthasarathi 2009), but the evidence from Harappa suggests that it was already in use during the urban Harappa Phase, c. 2600–1900 BC.

In addition to fabric impressions, there are rare examples of preserved fibers found in association with copper or silver objects, or rarely, inside steatite or terracotta beads. The following section will provide more detailed discussion of these fibers and the identification of specific fibers.

Cotton (*Gossypium* sp.)

The most commonly cited discovery of Harappan fiber was discovered in the early excavations at the site of Mohenjo-Daro where fabric used to wrap a silver jar was preserved through metal corrosion (Marshall 1931:1, 20, 218–219). The fabric was made using cotton threads with a warp count of 20 threads per inch (2.54 cm) and a weft count of 60 threads per inch (2.54 cm) (Gulati and Turner 1928). Another different fabric sample had a warp and weft count of 44×43 threads per square inch (2.54 cm), and the calculated weight of the fabric was around 4 ounces (113.4 g) per square yard (1 yard = 91.44 cm) (Marshall 1931:2, 585–586). Additional examples of cotton fiber have been discovered in the recent excavations at Harappa, also in the context of corroded copper or bronze objects that were wrapped in textiles (Kenoyer and Meadow 2001; Kenoyer 2004). Some of the fibers of cotton are part of woven fabrics (H2000/2114-73) with a loose Z-twist and plain weave (Fig. 2.9) and some are from threads made with a loose S-twist (H 1999/2811) used to string terracotta beads (Fig. 2.10). This later example shows the use of ripe fibers with hollow centers as is documented in some of the fibers from Neolithic Mehrgarh (Moulherat *et al.* 2002).

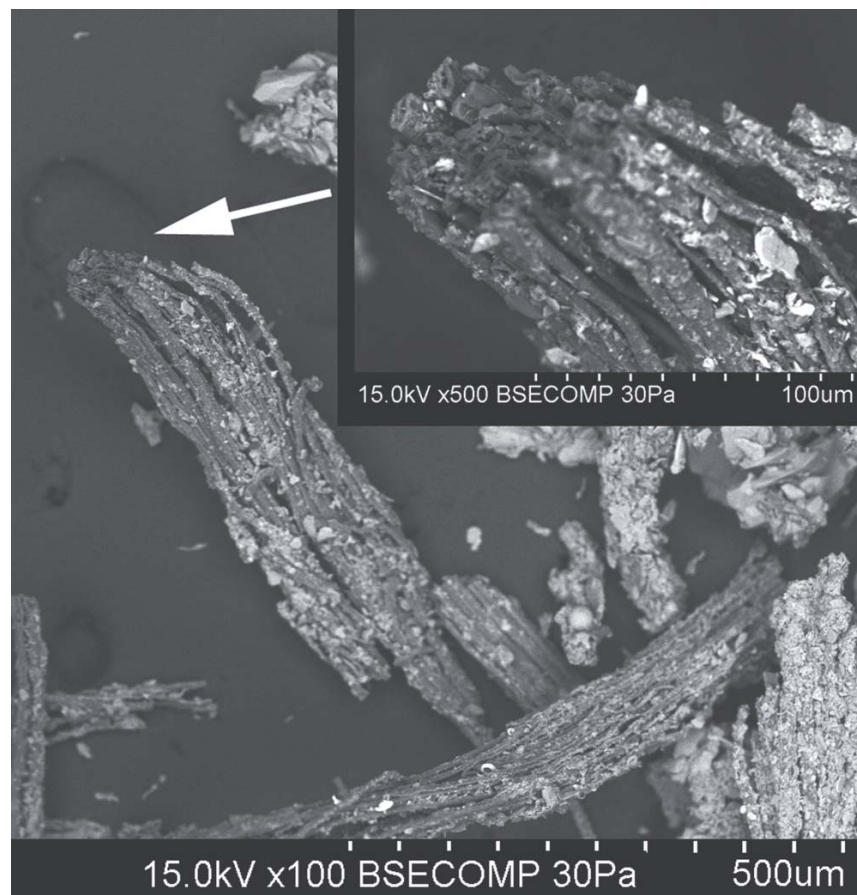


Fig. 2.10: Cotton fiber from Harappa (H1999/2811), SEM image (photo: the author, courtesy of the Harappa Archaeological Research Project and the Department of Archaeology and Museums, Government of Pakistan).

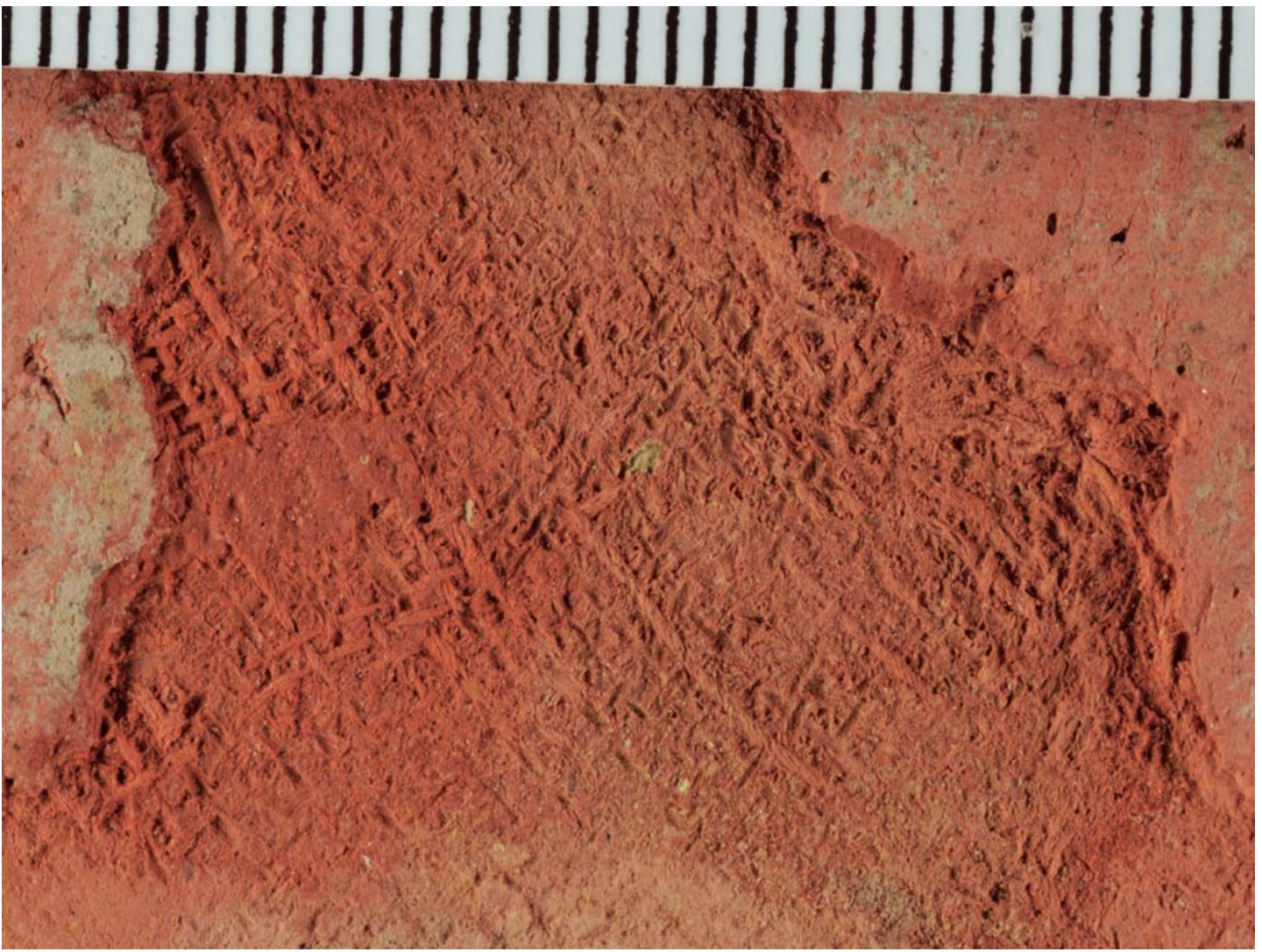


Fig. 2.11: Woven textile on pottery sherd, possibly jute, Harappa (H1988/398) (photo: the author, courtesy of the Harappa Archaeological Research Project and the Department of Archaeology and Museums, Government of Pakistan).

Bast fibers: flax (*Linum usitatissimum* L.) and jute (*Corchorus* sp.)

The discovery of seeds from oilseed and fiber-producing plants such as flax indicate that these plants were present in the environment around major Harappan sites in Gujarat, Punjab, Balochistan and Rajasthan (Fuller 2008). The discovery of flax seeds at Harappa, Nausharo, and Rojdi (Gujarat) during the Harappa Phase may indicate the use of the seeds for their oil as well as the use of flax fibers in making textiles. At present no conclusive examples of linen textiles have been reported from the Indus itself, but examples of hemp and jute fabrics and netting have been found at the site of Shar-i-Sokhta in the Helmand Valley of Balochistan and Iran (Good 2007; Wright *et al.* 2012).

At the site of Harappa, there is evidence for the use of bast fibers for fabric production: some of these fibers have been tentatively identified as jute *Corchorus capsularis* L. (Wright *et al.* 2012). Several examples of pottery dating to around 2200–1900 BC have impressions of fabrics that have been preserved by the fine slips that covered the fabric prior to firing. The preservation of fabric impressions after firing of the pottery has been described as follows: “Its presence in this location may be explained by a common pottery practice of draping damp cloth over areas susceptible to fast drying in order to slow the drying rate. A thin application of clay slip appears to have been washed over the surface of the cloth, coating each of the individual fibers of the threads with a thin film of clay. The cloth was still in place when the dish was fired, burning out the fibers but leaving the clay coatings intact” (Wright *et al.* 2012). The fabric preserved on this piece of pottery represents

single-ply, loosely Z-twisted fibers that were woven in a plain or tabby weave with 12–13 threads per square centimeter, balanced in both directions. Wright has suggested the use of spindle whorls in the production of the threads and points out that the quality of the textile demonstrates the experience and skill of the craftspeople who were producing this fabric (Wright *et al.* 2012). A closer examination of the fibers shows that there are considerable variations in the thickness of the fiber used in this textile, which is consistent with the type of fibers produced using bast fibers like jute and hemp (Fig. 2.11). Further studies are needed to confirm its identification as jute and eliminate the possibility of other fibers such as flax, hemp, or nettle. These weedy plants would have been quite common in the landscape around ancient Harappa and would have been relatively easy to process.



Fig. 2.12: Copper wire necklace with silk thread, Harappa (H2000/2242-1) (photo: the author, courtesy of the Harappa Archaeological Research Project and Department of Archaeology and Museums, Government of Pakistan).

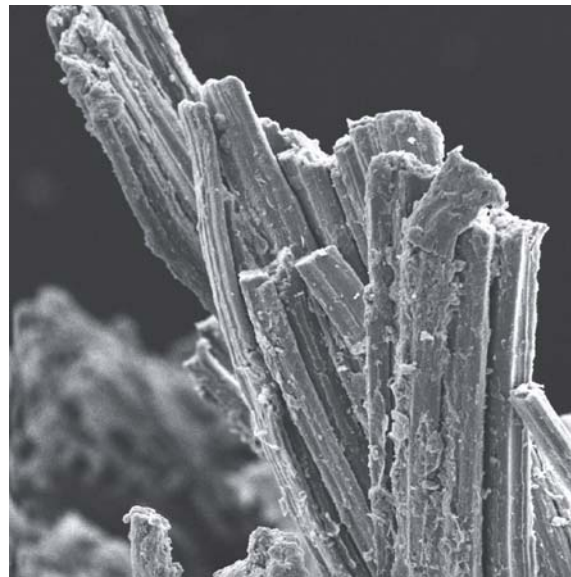


Fig. 2.13: SEM image of silk fibers from the copper wire necklace, Harappa (H2000/2242-1) (photo: the author, courtesy of the Harappa Archaeological Research Project and the Department of Archaeology and Museums, Government of Pakistan).

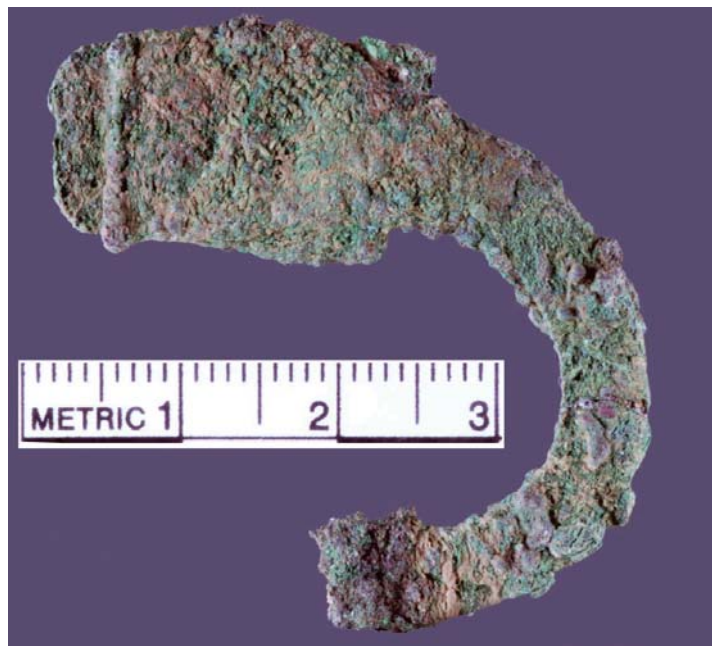


Fig. 2.14: Copper razor wrapped in woven silk fabric, Harappa (H2000/2164-1) (photo: the author, courtesy of the Harappa Archaeological Research Project and the Department of Archaeology and Museums, Government of Pakistan).

Wool

Wool is another fiber that has been tentatively identified in optical microscope studies of preserved fibers but has yet to be studied under higher resolution imaging as the samples are kept in the reserve collection at Harappa Museum. The fibers are preserved on corroded copper artifacts from Harappa. Some of the wool fibers studied by the author are relatively coarse and others are extremely fine. The fine wools, called *pashmina* and *shatoosh* today, may derive from distinct species of sheep, goat or high mountain antelope from the northern region of Jammu and Kashmir. The discovery of this type of wool would not be surprising since recent provenience studies of rocks and metals such as lead indicate Jammu as a possible resource area (Law 2011). Further studies are needed to confirm the types of wool being used by the Harappans, but the faunal remains confirm that they had both sheep and goat present at most sites (Meadow and Patel 2003).

Silk

Perhaps the most important discovery regarding the textiles of the Indus cities is the identification of wild silk fibers (Kenoyer 2004; Good *et al.* 2009; 2011) and a fragment of woven silk textile. At present at least three samples from Harappa have been identified as silk, and one sample from the site of Chanhudaro, which is located in the southern Indus Valley (Fig. 2.1). This means that silk was being used in both the northern and southern parts of the Indus River Valley and we can expect to find more examples in the course of future fieldwork. At Harappa, two samples were found quite near to each other in the excavations carried out in 2000 on the northwestern part of Mound E and date to Harappa Period 3B (2450–2200 BC). A third sample was found in 1999 on the eastern part of Mound E in excavations of the latest Harappan occupation, Harappa Period 3C (2200–1900 BC). The sample from Chanhudaro comes from levels that can be roughly dated to this same time period.

One sample from Harappa (H99/8863-2) of fibers (S-plyed Z-twist) was found inside a copper alloy bangle, and may have been used as a tassel. This fiber was tentatively identified by the late Irene Good as belonging to the wild silk species *Antheraea assamensis*, which is commonly known as *Maga*, *Muga*, or

Munga today (Good *et al.* 2009). The second sample (H2000/2242-1) of fiber (single-ply Z-twist) was found inside a copper wire necklace and tentatively identified as *A. mylitta*, which is generally referred to as *Tussar* or *Tussah* silk (Good *et al.* 2009) (Figs 2.12 and 2.13). A third sample (H2000/2164-1) was discovered next to the copper wire necklace in 2000, but was studied only recently. This object is a broken copper razor, similar to ones found wrapped in cloth or fibers in other parts of the site (Figs 2.14 and 2.15). The two broken pieces were wrapped with a piece of fabric that eventually became corroded and was preserved with the metal. Some traces of single strands of fibers were also found wrapped around the handle portion of the object, possibly as a decorative tassel or for protecting the handle. Both the woven fabric and the wrapped fibers appear to be silk, and probably *A. mylitta*. This identification can be based on the surface morphology of the silk fibers, which appear to be almost identical to those found in the copper wire necklace. The woven fabric is a plain weave with finely twisted fibers (single-ply Z-twist) (Fig. 2.14). The widths of the twisted threads are between 0.25–0.5 mm. There are approximately 18 threads per cm in the warp and 14 in the weft, with the weft strands being slightly heavier (around 0.5 mm each). The discovery of woven silk in the Indus at this early date is extremely significant as it represents the only evidence for early weaving of silk outside of China. The implications of this discovery will be addressed in more detail below and in the section on Early Historic textiles.

The final silk sample of the ancient Indus is from the site of Chanhudaro, which is located in the southern Indus valley (Mackay 1943). This site was an important production center for various types of elite commodities such as long carnelian beads, steatite beads, copper objects, and inscribed seals (Vidal 1989). The sample of silk was found inside a steatite microbead that was part of a lump of beads preserved on a copper dish. The copper salts may have had some role in preserving the fiber. “The thread consists of a single ply of approximately 40–50 strands, with a slight “S” twist (approximately 12–15 degrees). ... [The fibres] appear partially gummed and partially twinned, characteristic of a reeled (but not degummed) silk. ... The fibres may be from *A. assamensis* or possibly from a species of *Philosamia* (Eri silk)” (Good *et al.* 2009, 462–463).

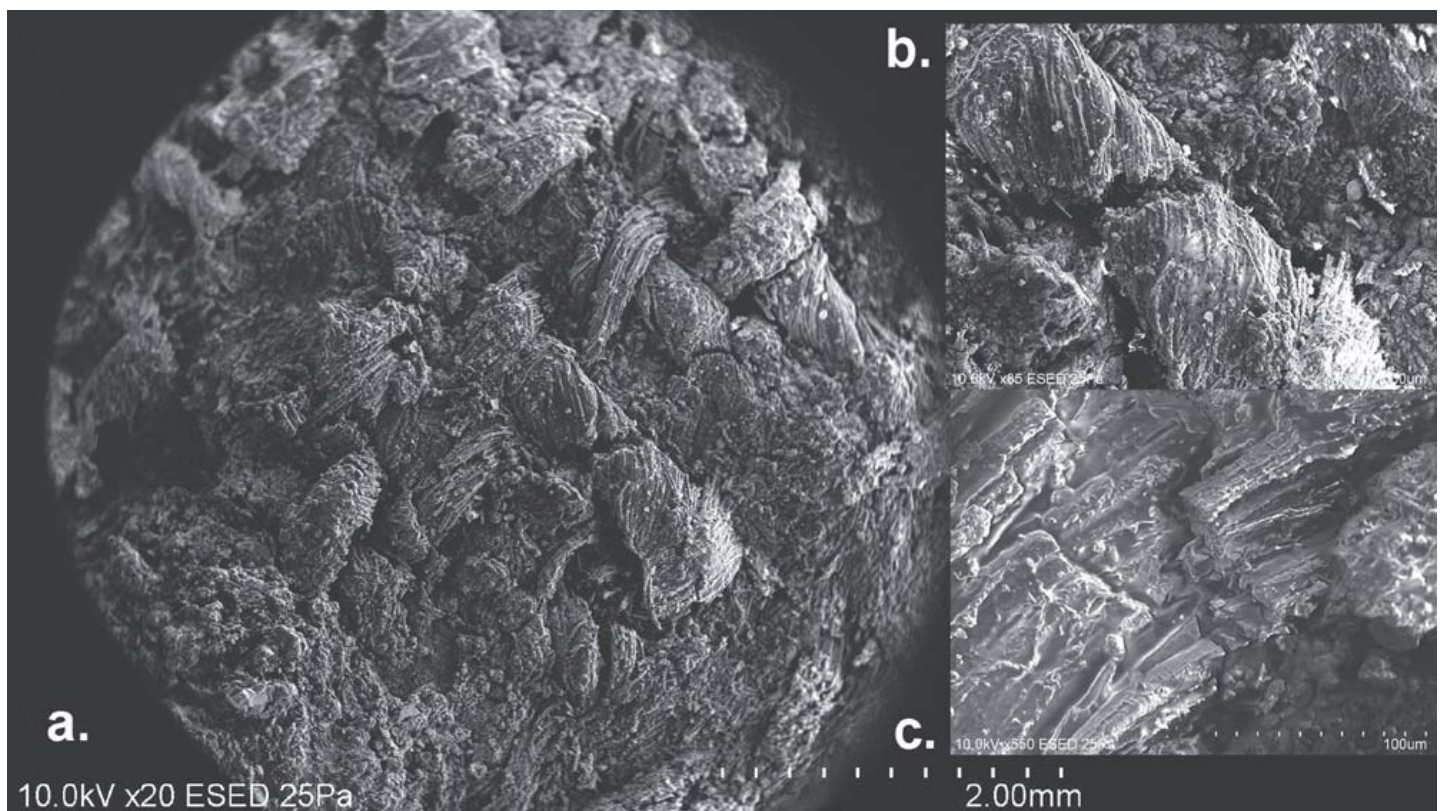


Fig. 2.15: SEM images of woven silk fabric, Harappa (H2000/2164-1) (photo: the author, courtesy of the Harappa Archaeological Research Project and the Department of Archaeology and Museums, Government of Pakistan).

The processing of the silk for spinning is also something that can be determined from the examination of the fibers under high resolution stereo electronic microscope (SEM). Some of the fibers from Harappa appear to have traces of sericin and appear to have been only partly degummed before spinning (Figs 2.13 and 2.15). Other fibers, particularly the sample from Chanhudaro, appear to have been partly degummed and reeled, which is a very different process and one that has up until now been linked to China (Good *et al.* 2009). The evidence that both degumming and reeling were practiced by the Indus craftspeople using wild silk suggests that these techniques were common throughout the regions where silk was being processed and not something that was exclusive to China.

The discovery of woven silk fabric in addition to the use of silk fibers for use as tassels and for stringing beads suggests that the Harappan use of silk was quite widespread. The fact that a broken copper tool was wrapped in a piece of silk cloth prior to taking it for repair or reworking suggests that silk was relatively commonplace and not simply a textile used for high-status attire. The use of silk in the Indus Valley also requires some major reevaluation of our understanding of silk use in the Prehistoric and Early Historic Periods. In the past, all discoveries of silk outside of China were attributed to Chinese silk or possibly the use of local wild silk (Good 1995): however, these discoveries in the Indus Valley now raise the possibility that some of the silk found in Central Asia, West Asia, Egypt (Lubec *et al.* 1993), and Europe may have come from the Indus Valley. The only way to differentiate these silks is to undertake more detailed comparative studies of the actual specimens. It is also possible that many of the early silk textiles from China were in fact made with wild silk and not from a fully domesticated variety (Peigler 2012).

The various interpretations of silk use during later periods in South Asia are also impacted by these new discoveries. So far there are no samples of silk found from sites of the Indus region during the Late Harappan period (1900–1300 BC). However, at the site of Nevasa, which is located in the northcentral Deccan of peninsular India, silk fibers were discovered in a copper bead necklace dating to around 1500 BC (Gulati 1961). Until the recent discoveries at Harappa, this find was assumed to represent an isolated occurrence and not taken seriously. It now appears that silk continued to be collected and processed in areas of peninsular India, far from the core regions of the Indus and the Ganges where the transition from the Indus cities to the Early Historic Period was taking place.

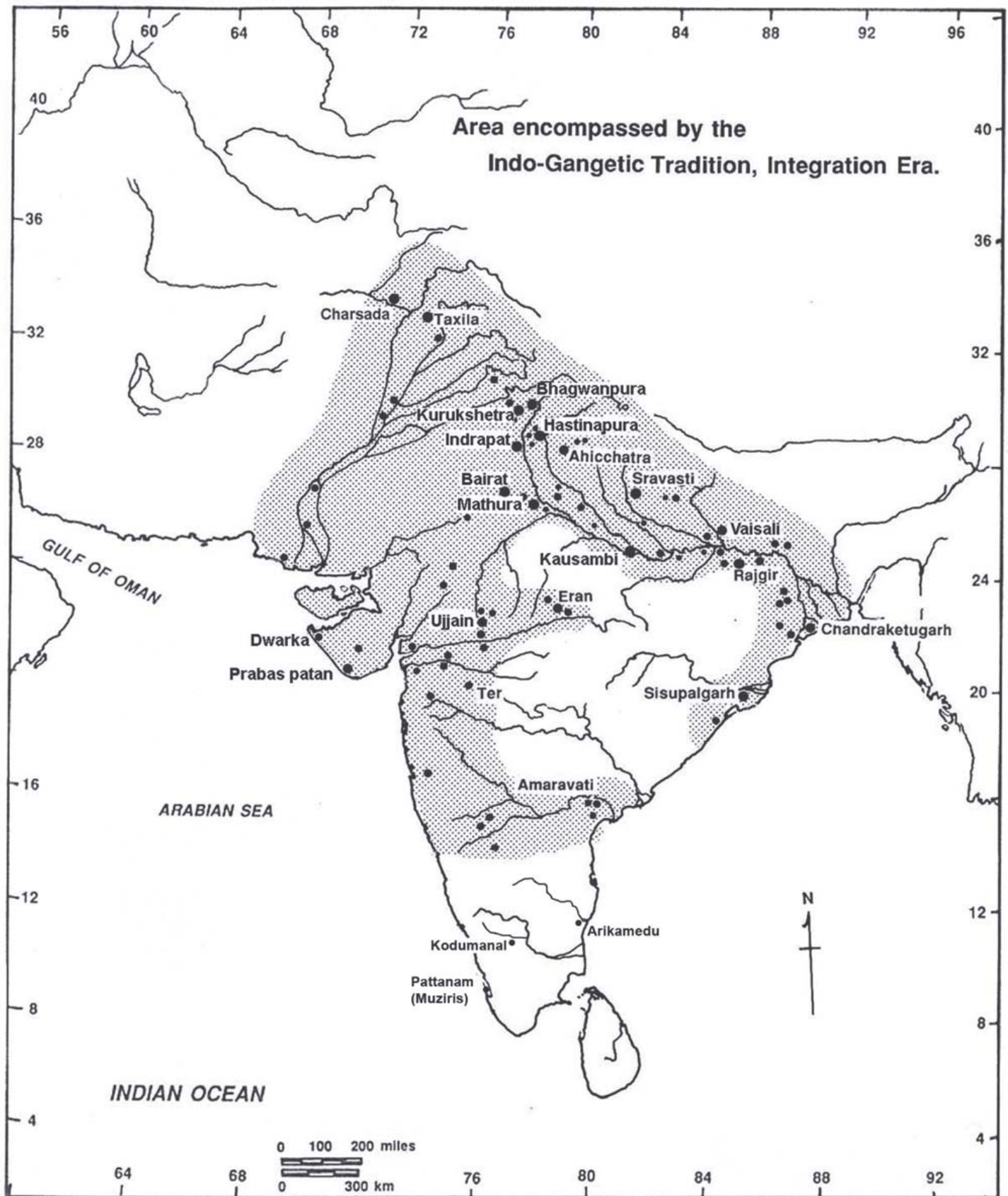


Fig. 2.16: Map of the Early Historic polities and major trade regions (drawing: the author).

Early Historic Period textiles

The Early Historic Period in South Asia can be defined in many different ways, but for the purpose of this paper, it can be dated from around 600 BC with the establishment of early polities in the Ganga-Yamuna River Valley, and continues until around 320 AD with the emergence of the Gupta Dynasty (Table 2.2; Fig. 2.16).

This time period corresponds to what can be termed the Indo-Gangetic Tradition, which followed the decline of the Indus Tradition (Kenoyer 1995; Kenoyer 2006b). In contrast with earlier models that see the emergence of cities in the Gangetic region and then a gradual spread to the upper and lower Indus River Valley, new excavations in Pakistan suggest that there is a relatively unbroken tradition of urbanism linking the Late Harappan period in the northern Indus Valley with the first large settlements of the Painted Grey Ware Culture and other traditions in the northwestern subcontinent (Kenoyer 2010a).

Table 2.2: Indo-Gangetic Tradition

<i>Regionalization Era</i>	
Vedic and non-Vedic chiefdoms (oral traditions)	1500–800 BCE
Painted Grey Ware (archaeological culture)	ca. 1200–800 BCE
Northern Black Polished Ware (archaeological culture)	900/700/500–300 BCE
Early Chiefdoms and City-States (historical polities)	600–300 BCE
Nanda Dynasty	362–321 BCE
Achaemenid Persian occupation in the Northwest	559–326 BCE
Invasion of Alexander of Macedon	327–326 BCE
<i>Integration Era</i>	
Mauryan Empire	321–185 BCE
<i>Localization Era</i>	
Sunga Dynasty: Indo-Gangetic region	185–71 BCE
Graeco-Bactrian rulers: Northwest, Afghanistan and Indus region	c. 190–150 BCE
Parthians (<i>Pahlavas</i>): Iran, Afghanistan and Indus region	c. 155 BCE–78 CE
Kushana Dynasty: Northwest and Gangetic region	c. 78–300 CE
Saka Kshatrapa: Western Peninsula and Sindh	c. 80 (94)–130–388 CE
Gupta Dynasty: Indo-Gangetic region	320–540 CE

(dates compiled by the author from numerous sources including Allchin 1995; Cribb 1996; MacDowall and Taddei 1978; Magee 2004; Singh, U. 2008; Sinha 2001; Thapar 2002)

The presence of prosperous settlements in the northern Indus region was undoubtedly a major motivation for the Achaemenid Persians to conquer this region around 559 BC and to maintain control of the area until the conquest of Alexander of Macedon in 327/6 BC. Unlike other provinces ruled by the Achaemenids, the only recorded tribute from the Satrapy of Sindhu was gold in the form of gold dust that was presumably collected from the various gold-bearing rivers of the northern Indus River Valley. However, in addition to tribute, this region is known to have provided many other types of trade commodities, including textiles such as cotton, wool and silk (Jain 1974).

While the Indus Tradition could only be studied using the discoveries found in archaeological excavations, the subsequent periods can be approached using a combination of archaeology, oral traditions, and written records from various sources. Due to the limited scope of this paper, the information on the use of textiles during the Vedic period cannot be addressed in detail (Gopal 1961; Balkrishna 1925), but a short summary of the major types of textiles will be presented before discussing the later periods. There are few archaeological sites that can be associated with the earliest periods, but many sites can be associated with later times. Unfortunately, except for the discovery of cotton at a Painted Grey Ware site in the Gangetic plain (Kumar 2010), no direct evidence for textiles has been published from these excavations, so most of the information comes from indirect evidence (spindle whorls, loom weights, etc.) and oral traditions/written texts.

Since the main focus of the following discussion will be based on texts, it is important to give a general chronology for the various sources.

The dates for the oral traditions preserved in Vedic texts cannot be accurately determined, but they are thought to date to a period prior to around 1500 BC (Bhattacharya 1999; Thapar 2000). The epic texts of the *Mahabharata*, *Ramayana* and numerous *Puranas* are also difficult to date precisely, but most can be dated prior to the emergence of cities in the northern Indo-Gangetic region around 600 BC. There are also many texts associated with the lives and times of the Jain saint Mahavira and the founder of Buddhism, Siddhartha Gautama (c. 600–400 BC), but the compilation of the texts is much later, and most date to after the 1st century AD. The *Astadhyayi* is a grammatical treatise that also contains important geographical and political information. This text is attributed to the grammarian Panini and dated to around the 5th century BC. However, it contains elements that may have been contributed by his predecessors and later editors. The *Arthashastra* is a text on statecraft that is attributed to Kautilya, a minister of Chandragupta Maurya during the 4th century BC. This comprehensive text is one of the most important sources of information on the nature of Early Historic monarchies, republics and politics in general. The *Manavadharmashastra* or “Code of Manu” is thought to be of great antiquity, but its compilation in the form known today can be dated to between 100–300 AD on the basis of references to historical communities such as the Greeks (*Yavanas*), Scythians (*Sakas*) and Persians (*Pahlavas*) (Allchin 1995; Sinha 2001; Singh, U. 2008; Thapar 2002; Olivelle 2004).

In the earliest Vedic literature (*Rg Veda*) the major textile referred to is wool, primarily from sheep (Chaturvedi 1999). In later Vedic texts there are references to many other types of fibers that include hemp and possibly jute, as well as linen, and other fibers made from bark, grasses or leaves (Gopal 1961; Chaturvedi 1999). Terms for weaving and preparing fibers for spinning are well attested in the texts, including terms for stitching, embroidery, dyeing, and painting, using colors that include red and light brown (tawny). Both men and women were associated with textile production but this craft is most commonly associated with women (Chaturvedi 1999). It is noteworthy however that there are no references to cotton in the *Vedas* (Gopal 1961). When cotton is mentioned in later religious texts (*Smriti* texts), it is considered to be ritually impure and not appropriate to wear during specific rituals. This situation suggests that Vedic communities learned about cotton from other communities who were living in the Indus Valley and Gangetic regions (Gopal 1961). Another explanation could be that the initial composition of the Vedic hymns dates to a period earlier than the use of cotton at sites such as Mehrgarh (i.e., 7000 BC). Eventually, however, the ritual proscriptions against cotton were abandoned and a cotton thread was worn by Brahman men as an indication of ritual status and purity (Das, S. K. 1930), a practice that continues today. It is also important to note that there is no mention of silk in the Vedic texts, though some scholars have suggested that fine fabrics refer to it (Gopal 1961; Singh, U. 1994).

The later Vedic period reflected in the *Mahabharata* and the *Ramayana* texts includes many references to individuals wearing different types of textiles and gifts of textiles that reveal their importance in the economy and trade. Generally speaking the terms for wool, linen, cotton, hemp and even silk that are found in these texts derive from Sanskrit terms or words based on other South Asian languages (Ali 1900 (1974)) such as Dravidian or possibly Mundari. The indigenous roots for the textile terms suggest that the textiles themselves were developed locally. This is particularly important when discussing the terms for silk. The term for the silk worm, as well as silk cloth as defined by the grammarian Panini, is *kausheya*, and is derived from the term for the silk cocoon, which is *kosha* (Balakrishna 1925, 49). In addition to *kausheya* many other indigenous terms have been identified in the various texts, but some terms clearly had multiple meanings and the context is critical for determining whether the word refers to silk or to another material. One important example is the word *patta*, which is used to refer to both silk and to hemp, depending on the context (Gopal 1961, 56). In the *Ramayana*, Sita is said to put on a silken (*kausheya*) dress. The *Mahabharata* mentions silk cloth (*kausheya*) woven with pearls. The term *kitaja* refers to silken clothes in general and King Yudhisthira of the *Mahabharata* is said to have received gifts of silken cloth from *Vahlika* and *Cina* (Balakrishna 1925; Gopal 1961). Although

the events of the *Mahabharata* and the *Ramayana* predate the major contacts between South Asia with the Achaemenid Empire to the West, and China in the East, later additions to the texts do contain some references to distant regions, such as *Vahlika* (Balkh or Bactria) and *Cina* (China). The precise date for contact between South Asia and China is not known but generally speaking, the use of the term *Cina* for China is thought to date to the period of the Qin dynasty (Gopal 1961), around 221 BC.

The *Arthashastra* is one of the most important texts providing evidence for the nature of silk production in northern South Asia during the early Mauryan Empire (321–185 BC) (Rangarajan 1992). Textile production was one of the important industries used to support the Mauryan state, and was carefully regulated. All the major fibers discussed above are mentioned in the text, wool, cotton, linen, hemp/jute, and silk. Much of the silk production during the Mauryan period is centered in the eastern regions of Bengal (Gopal 1961) that includes the lower Gangetic River Valley and the farther Brahmaputra River that flows through the modern Indian state of Assam and the country of Bangladesh. During the later Kushana period that corresponds to intensive Roman contact with India by sea, ports along the coasts of South India and the interior sites of the Deccan Plateau were major centers for production of gemstones and other commodities that were in high demand in the Mediterranean, including cotton and silk textiles (Das, D. R. 1969; Cherian *et al.* 2007; Kelly 2009; Rajan 1994). There are over 30 different terms for various types of native silks from Tamil literary sources in South India that are distinct from silk derived from China (Gopal 1961, 62), so this region may also have been a major production zone for silk in the past, as it still is today. The terms for silk include both Sanskrit-based words mentioned above, as well as new terms that indicate the use of imported silk from *Cina* (China or Central Asia) or silk derived from a new variety of silk moth that was brought from *Cina* (China or Central Asia). The terms *cinamsuka* or *cinapatta* were used to distinguish between local South Asian silk and silk that was imported from either Central Asia or China. The term *patrorna* is thought to have been used to refer to silk produced by worms feeding on mulberry leaves, so there is clear indication for the local production of mulberry-based silks as distinct from wild silk moths and worms that live on other types of trees (Balkrishna 1925; Gopal 1961).

Wild, cultivated and domestic silk

Most scholars assume that the Chinese domestic silk moth or worm (*Bombyx mori*), which has lost its ability to fly, along with the mulberry tree that it feeds on were both introduced to South Asia at some point in the Early Historic Period (Singh, U. 1994). However, it is important to note that the wild ancestor, *Bombyx mandarina* (Moore), is found distributed in both China and South Asia and that people in both regions might have been collecting wild silk for hundreds or thousands of years before the process of domestication was complete. The earliest evidence for the use of silk in China dates to around 2570 BC from the Liangzhou Neolithic site of Qianshanyang (Good *et al.* 2009, 458, referring to Zhou 1980; Vainker 2004). The discovery of silk in China is generally contemporary with the dating of the first wild silk found in the Indus Valley (i.e., 2450–2200 BC). It is not known whether this early example is made from domestic or wild silk, and it is not clear when the domestic variety actually became dominant in the silk industry. Furthermore, there is evidence that another silk moth species, *Antheraea pernyi*, which is raised on oak trees and called *tussah*, was also commonly used in ancient China, with textual evidence for large-scale production as early as the Han period (Peigler 2012, 95, referring to Chou Iau (Zhao Yau) 1990; Chou Iau (Zhao Yau) 1988). While *B. mori* and *A. pernyi* fed on different types of trees and were probably raised in different regions of China, it is not unlikely that silk as well as yarn produced from these two species were being exported from China. Since both species can be degummed and reeled, it is not clear how distinct the two types of fabrics would have been in the past, even though they are quite easy to differentiate in modern production. This new evidence suggests that not all of the

silk being produced and exported from China was from the domestic species *B. mori*, and makes it even more difficult to differentiate imported Chinese silk from that produced in South Asia, where *tussah* or “wild silk” was also being produced. When textiles are woven, it is possible to determine styles of weaving and patterns from different regions, but the export of raw silk or yarn would be extremely problematic. The only technique that might work would be to analyze the various isotopic signatures of the silk fiber to determine the geological region in which the silk moth and worms were living (Price 2000). This technique has not been undertaken as it requires destructive analysis of fibers to obtain the isotopic signature.

While it is unlikely that two independent processes of domestication of *B. mori* took place in Asia, it is possible that if wild *B. mandarina* was in fact being collected in South Asia, this practice was abandoned with the introduction of *B. mori* from China. The discovery of wild silk in the Indus period and other recent genetic studies show that the so-called “wild” silk moths of South Asia have been exploited and probably cultivated for more than 5000 years, resulting in major differences between true wild populations and cultivated ones. Long-term human intervention in breeding cycles and the preservation of larger cocoons for breeding has eventually resulted in larger cocoons with longer strands and therefore larger quantities of silk. The modern populations of *tussah* (*A. mylitta* and *A. pernyi*), *muga* (*A. assamensis*), and *eri* (*Samia Cynthia*) are all distinct from their ancestral wild populations, even though they continue to be cultured outdoors and harvested from trees (Peigler 2012).

Conclusion

The literary references to silk production in India discussed above have long been cited in publications from South Asia, beginning with the critical articles written by Mookerjee (1912) and Balkrishna (1925). These early scholars argued that India – i.e., South Asia – had an indigenous silk industry prior to contact with China. Subsequent authors have echoed their sentiments and added occasional new references (Gopal 1961; 2001; Jain 1974; Singh, U. 1994), but textile historians and general historians have never taken these arguments seriously. South Asia was widely recognized as a major source for cotton, but silk was invariably attributed to China or some other region (Barber 1991; Good 1995).

It is only now with the discoveries of woven silk and silk fibers used in ornaments from Harappa and Chanhudaro and the new research on the different species of silk moths that these early statements of indigenous silk production in South Asia can be justified. With this new information, it is possible to critically evaluate and shed new light on the Persian, Greek and later Roman perceptions of India and their discussions of silk (on Greek and Latin terms related to silk and their possible interpretations, see also Chapters 3 and 4 in this volume). In all of the Greek and Roman texts, the term for silk was associated with a people, the *Seres* or their country, *Serica*, “the land of silk” that was located to the east or northeast of Persia (McCrindle 2000 (1927); Parker 2008). The fact that *Serica* was referred to separately from India has resulted in the assumption that they were in fact perceived as distinct regions, but this assumption needs to be reevaluated. The Achaemenid and early Greek sources do not mention the term *Seres* but most scholars assume that silks were being used during the Achaemenid period based on later Greek and Roman texts. The term *Seres* is first attributed to Strabo during later Roman times, though some have argued that it originated earlier (Jones 1924). The main confusion appears to be the translation of *Serica* to China. Technically speaking the *Seres* were the people who made silk from the silk worm (*ser*) and given our current knowledge of early silk in India, they could have lived in either South Asia or Central Asia, which were both located at the eastern edge of the known world for the early Greeks (Parker 2008). When the author of the *Periplus* lumps all silk under the term “linen of *Serica*”, it has been assumed that the place being referred to is China (Schoff 1912; Parker 2008). This assumption should be rejected, because it is clear that China was not the only place producing silk. The

situation becomes even more complex when one takes into account the facts that by the early centuries BC/AD, both China and South Asia were cultivating “wild” and domestic silks and that the major trade between the two regions was through Central Asia, though there is some new research that suggests some trade may have taken place between Yunnan and eastern India (Yang 2008). In later Greek and Roman texts *metaxa* comes to be used for “raw silk” which is thought to refer to the *Antheraea* species of “wild” silk that is called *tussah* (Arozena 1994; see also Chap. 4 of this volume). If further research can demonstrate that the distinction between *serica* and *metaxa* is valid, then the problem will be to differentiate between “raw silk” from south Asia and the same type of silk coming from China. The same problem will have to be addressed for *B. mori*, which was clearly being cultivated in South Asia as well as other regions outside of China.

The role of South Asia in both the overland and sea trade of the Early Historic Period needs much more research, and in particular the scientific analysis of wool, cotton, and silk that may have been passing in and out of the region. For example, the ongoing excavations at the Roman port of Berenike on the Red Sea have found much evidence for cotton textiles (Sidebotham 1996), but so far there is no report of wool or silk that must have also been part of the trade through this route. There are still many questions that need to be answered, but it should be assumed that much of the silk that was being traded to the west was not exclusively produced in China. It is also important to reject the idea that the silk being traded from South Asia to the west was simply the transshipment of yarn and silk textiles imported from China. The overwhelming textual evidence from South Asia and evidence for silk production in the earlier Indus period suggest that both locally produced and possibly some imported silk were being traded from South Asia. This revisionist approach should not be taken as a rejection of the important role of China in the silk trade or the “Silk Road”, but rather the inclusion of other participants and commodities that made this trade richer and more diverse.

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Word migration on the Silk Road: the etymology of English *silk* and its congeners

Adam Hyllested

“Silk” in Europe and Asia

The exchange of silk along the Silk Road is often examined through archaeological finds and the interpretation of historical texts. This contribution seeks to address the question of exchange along the Silk Road and especially the ways through which the silk reached the West by discussing the etymology of *silk* in Western and Northern European languages from antiquity to modern times. The chronological scope of this article is vast in order to better understand the different notional concepts through which the material was classified, the different routes the silk trade could take and the ethnic groups who were involved.

Most etymological dictionaries (notably *ODEE* 827; de Vries 1962, 487; Vasmer 1953–58 III, 387; Falk and Torp 1960, 966–967) agree with and basically just repeat the standard etymology of English *silk*, Old English *seoloc*, *seoluc*, *sioloc*, *seolc*, and its immediate congeners in Germanic (Old Norse *silki*, Danish, Norwegian, Swedish *silke*,¹ borrowed into Finnish and Karelian as *silkki* and into the Western Saami languages (see SKES IV, 1025);² Old High German *silehho* “toga”, *selachin* “cover”), Baltic (Lithuanian *šilkas*, *šilkai*, Samogitian dial. *silkaĩ*, borrowed into Latvian in the expression *silkuôts* “sewn with silk”; Old Prussian *silkas*) and East Slavic (Old Russian *šilkŭ*, borrowed into the New Curonian dialect of Latvian as *šilks* and continued in Standard Russian *šēlk*, Belarussian *šolk*, Ukrainian *šovk* and Northern Russian *šulk*, from where it has been transmitted to North-Eastern Balto-Fennic languages, and, via Karelian, further into Eastern Saami³). The Baltic forms are regarded as old loans from Slavic (Fraenkel 1962–65, 983–984). Schrader (1904–05, 34) states that the Germanic forms must have been transmitted via Slavic.

All refer to the ultimate source as Old Chinese, the language of the area where the silk industry began, becoming important as early as the third millennium BC (Wang 1993, 225). Most scholars further envisage that the journey of this word towards the West in some way involves Written Mongolian⁴ *sirkeg* “silk fabric” and Manchu *sirge*, *sirhe* “silk thread, silk floss from a cocoon; string of a musical instrument”, thus pointing to the important role nomadic tribes played in the distribution of silk. Hardly surprising, the standard handbooks also agree that the word was transmitted in antiquity together with the trade of silk fabric along the Silk Road. It is a typical *Wanderwort* of the later, historical kind, where the ultimate origin is at least superficially rather obvious but the ways of transmission less certain (while, for prehistoric culture words, even the source is often

obscure). In this particular case, beneficially for us, the transcontinental Silk Road constitutes a concrete historical route along which we can hope to track the word and its intermediate stations on its way from East Asia to Europe, catching glimpses of the transmission of not only the word, but also the material.

The Chinese source is the precursor of Modern Chinese 絲 *sī* “silk; thread; string”; it is commonly reconstructed as Old Chinese **sə* or **siag* (thus Wang 1993 with references) and Middle Chinese **si*. It is related to other Sino-Tibetan words denoting “thread”, “string” or “sinew”. Neighbouring Asiatic languages all reflect a final *r*-element, which, if not reconstructable for Old or Middle Chinese, must be explained as suffixal in one of the lending languages from which it can have been transferred further: Middle Korean *sīr* (> Modern Korean *shil*), Manchu *sirge*, *sirhe*, Written Mongolian *sirkeg*. It is however possible that the *-r-* does go back to Chinese and reflects a second noun 人 *rén* “people” (Genaust 1996, 578) in which case the word borrowed from neighbouring languages would not be a designation for “silk” as such, but rather a compound-like ethnonym already at the time of contact (whose meaning would correspond exactly to Greek Σῆρες “silk men”: see the next paragraph). Whatever the exact details of this entanglement, there can be no doubt about a starting point in East Asia as far as its identity as a culture word is concerned.

The silk men

Further, there is no question either (e.g., Frisk 1960–66, 697) that Classical Greek σῆρικός (*sērikós*) “silken, of silk”, substantivated σῆρικόν (*sērikón*) “silk”, transferred into Latin as *sēricus* and *sēricum*, respectively, is formed from the same root as English *silk*. It referred however not only directly to raw silk and silk fabric, but also to its oriental origins. The Σῆρες (transliterated *Sēres*, but with the Latin form *Sērēs*), “silk men”, were initially of unknown ethnicity to the Greeks and Romans because they bought the silk via middlemen who transported it to the West from trading stations in Central Asia. Consequently, the “land of the *Sērēs*” acquired legendary associations until geographical knowledge of the Orient increased in the first centuries AD (Genaust 1996, 578–579; Thau-Knudsen 2000). Ptolemy already in his *Geographia* from 150 AD knew that their land stretched beyond the *Imauni*, i.e., the Pamir Mountains in Central Asia. The Chinese sequence *sī rén*, or whatever exact form was the starting point, must have been transferred via Central Asiatic peoples to Europe and European languages; it cannot have been borrowed directly by European languages. The question then remains: what kind of Central Asians?

There is clear evidence that not only Europeans used the “silk” term to denote the peoples of Central Asia, and that the term was used not only about traders, but about entire populations, again matching the translation “silk people”. First of all, on the famous Tonyukuk monument from 720 AD, found on the right bank of the upper course of the Tuul (Tola) river in Mongolia, the third and the fourth lines of the Western side read “*türk sir bodun yerintä/bod qalmadi*” “in the land of the Turkic *sir* people, no group of people were left (any longer)” (Ramstedt *et al.* 1958, 30–31), and the term is mentioned again later in the inscription. Furthermore, the very ethnonym *Turk* in all probability derives from a translation of this name: that is, that similar words meaning “silk” are found in all three Altaic branches – Old Turkic *torkū* “silk fabric”, Middle Mongolian *turke*, *torkan*, Written Mongolian *torgan* “silk, satin”, Solon Evenki *tōrga* “silk”.⁵

While it seems clear to everyone that the root element *sil-* of the word *silk* and its congeners must be identical to *sēr-* in Greek σῆρικόν (*sērikón*) and the *Sērēs*, and that the source of this element is Chinese, it has not yet been resolved how an *-ilk-* form might have arisen along with the *-ērik-* form, and why the variant with *-l-* is found exactly in some Germanic languages, in Baltic and in East Slavic (leaving aside the aberrant South Slavic form *svila*).⁶ In fact, etymological handbooks in general seem to avoid explaining the variation. Vasmer (1953–58 III, 387) surmises that the Germanic forms are borrowed directly from Latin, which, however, does not explain the lambdacism, and that the Old Russian form, because of its initial consonant *š-* which constitutes

yet another difference from the Mediterranean form, must rather have come from some unknown Eastern source.⁷ While it is very plausible that the first intermediate stations were Altaic (Turkic, Mongolian, Tungusic) and perhaps Tocharian (Wang 1993, see also Hilmarsson 1984 on Tocharian *śorkām* “string”), pointing to the nomadic peoples of North-Western China and the Tarim region, none of the languages of these groups preserves a form with *-l-* and the meaning “silk fabric”. What we are searching for is therefore a language at the Western End of the Silk Road that can have transformed *-r-* into *-l-* and which, at least linguistically, played a crucial role in the transmission of silk from East to West.

A northeast European isogloss

The geographical distribution of the *silk* word in Europe provides some clues for its further migrations. As can be seen from the above list, it occurs in Germanic languages (from where it has been borrowed into North-Western Balto-Fennic and Western Saami), in Baltic languages, and in East Slavic (borrowed into North-Eastern Balto-Fennic, Southern Balto-Fennic and Eastern Saami). In Western Europe, the successor of Latin *saeta* “stiff hair, bristle” has become the dominant term, however, from the expression *saeta sērica* “silk thread” (lit. “silk hair”).⁸ Thus, Modern High German *Seide*, Dutch *zijde*, Swedish *siden*, Latvian *zīds*, Estonian *siid* (in the latter two via Middle Low German, from Latvian further into Livonian as *zīd*) and terms in the Romance languages (French *soie*, Spanish and Portuguese *sedá*, Italian *seta*) are all ultimately, the Romance forms directly, from Latin *saeta* and thus unrelated to the word *silk* despite superficial similarities. In other words, the *l*-form seems to be confined to Northern and Eastern Europe – and the full form involving both *-l-* and *-k-* is certainly found only there.⁹

During the Viking Age, silk was brought to Northern Europe by the Varangians, Nordic merchants who traveled through Kiev Rus and reached Constantinople, where they traded with local merchants (see Vedeler 2014). One prominent example from the Icelandic sagas is the account of the Norwegian King Sigurd the Crusader’s visit to Miklagard (Byzantium) in 1110, recorded in Snorri Sturluson’s *Heimskringla*¹⁰ (see Blöndal 2007, 136), and from Nestor’s Chronicle we know how Russian envoys were given gifts of impressive silken brocades during a visit to Byzantium in 912 (Hedeager Krag 2013). Given the geographical distribution of the *silk* word, it is likely that the Varangians brought the word with them through Russia all the way to Scandinavia.

An Alanic sound law

To sum up so far, although it is undisputed that the Chinese silk word must be the ultimate source of several similar European terms for “silk”, the reason for the irregular variation between them has remained a mystery, and the exact languages that transferred them into Europe via Central Asia have resisted discovery. While inherited words generally adhere to the regularity of sound laws, culture words, because of their tumultuous history as terms for migrating products and inventions, typically occur in numerous shapes whose internal relations are difficult and sometimes impossible to untangle. In the case of “silk”, the geographical distribution of the varieties may hold the key to a solution. We have seen how the *-l-* variants are found primarily in Northern and Eastern Europe, notably in Old English, Old High German, Old Norse, Baltic and Old Russian, while the *r*-variants have basically spread from Greek. A scenario where this variant of the silk word migrated northwards from Byzantium through present-day Russia and the Ukraine to Central and Northern Europe is compatible with the historical records. Since Chinese (and Manchu, Mongolian, etc.) word forms start out with *-r-*, it seems reasonable to assume that the Greek form of the word would be the more archaic one. What we are

looking for, then, is a language spoken near the Western end of the Silk Road, and, in addition, a language in which a sound law regularly transformed the sound *-r-* into *-l-* before the seventh century AD¹¹ (but possibly much earlier), and which would be sufficiently culturally important as to provide or disseminate important culture words.

Crucially, the regular development of older (Proto- Iranian) **-ri-* and **-r̥i-* in the subgroup of the so-called Scytho-Sarmatian languages within Iranian, comprising Scythian, Sarmatian, Alanic, Iassic and Ossetian, is exactly *-l-* (Bielmeier 1989, 241). This can be seen, first and foremost, in the name of the Alans themselves, Gk. Ἀλανοί (*Alanói*), since it derives from the same (Indo-)Iranian self-designation **arjāna-* that has yielded the very name of *Iran* and the infamously politically misused term *Aryan* (originally, and among linguists and historians still, denoting Indo-Iranian, but not other Indo-European peoples). We know that this name does not derive from a language that turned *r* to *l* in general because a subgroup of the Alans were called Ῥωξολανοί (*Rhōxolanói*) which must reflect Proto-Iranian **rauxs-arjāna-* “shining Iranians” (where **rauxs-* in itself comes from Proto-Indo-European **leuk-s-* with regular Iranian development of **l- > r*), and, more indirectly, by the amalgamated name Ἀλανορσοί (*Alanorsói*), mentioned by Ptolemy, where the second element is the name of the other subgroup, the Ἀορσοί (*Aorsoi*) whose name derives from Proto-Iranian **aruša-* “white” (Modern Ossetian *urs / ors*: Cheung 2002, 7). At the same time, it is known to have been an endonym, i.e., the Alans’ name for themselves. A widespread alternative name, originally an exonym but later adopted as an endonym, was Ἄσιοι (*Ásioi*), reflected in the name of Iassians, the Iazyges and the Ossetes, with no certain etymology.

The Proto-Iranian form **arjan-* is also indirectly attested as an Alanic loanword in the North-East Caucasian Nakh languages: Chechen *ēla*, Ingush *āla* “prince (of a principality), chieftain” and Tsova-Tush (Batsbi) *ālē* “lord, gentleman” can be reconstructed with a Nakh protoform **alā* that, in all likelihood, was borrowed from Alanic **alan-* < Proto-Iranian **arjan-* (compare Ossetian *Allon*, a mythological tribal name (Bielmeier 1989, 243; Thordarson 2009)). Furthermore, the term occurs with the typical Iranian suffix **-ka-* in Ossetian *Alægatae* (a Nart tribe) < Proto-Iranian **arjaka-* (Thordarson 1989, 478).¹²

Another old attestation of the sound law occurs in Herodotus’s Scythian name Κολάξαϊς (*Koláxaïs*) since this most likely comes from Proto-Iranian **x^warja-kšaja* “sun-king”. Alkman’s ἵππος Κολαξαῖος (*hippos Kolaxaios*) shows that the development had taken place by at least the seventh century BC (Hinge 2005).

One further old example of the development **-ri-*, **-r̥i-* > Alanic **-l-* comes from the much later bulk of Alanic (Iassic) loanwords in Hungarian, transferred via the Iassic settlements in the thirteenth century. Hungarian *zöld*, *zeld* means “green, unripe” and is borrowed from Alanic **zalda-* < Proto-Iranian **zarita-* (corresponding to Vedic *hárīta-* and ultimately the same Indo-European formation as English *gold*, only with different ablaut). Most examples of the sound law are from Modern Ossetian: e.g., the preverb *fæl-* < **pari-*; Iron dialect *mælin*, Digor *mæln* “to die” < **mr̥ja-* (the same Indo-European root as in Latin *mortuus* “dead”, and, as a loanword from French, English *mortal*); Digor *zældæ* “young grass; grass; turf” < **zarita* “yellow” (~ Avestan *zairita-*, Vedic *hárīta-* “yellowish” and, with a different ablaut grade, English *gold*), and *næl* “male” (Digor originally *nælae*) < **narja-* (~ Avestan *nairiia-* “male, virile”).

This means that if a foreign word containing the sequence **-ri-* (or **-r̥i-*) was borrowed into Alanic or another stage of Scytho-Sarmatian early enough, it would have yielded **-l-* in Alanic itself by regular sound development. This would have to have occurred already in Antiquity since the Alanic self-designation with *-l-* is mentioned by Strabo and Ptolemy. According to Pliny the Elder (*Natural History* 6, 49), both the Jaxartes River and the Tanais (present-day Syr Darya and Don, respectively) were called *Silis* by the Scythians, suggesting a development of **-r-* to “Scythian” *-l-*. Even though it is far from certain that the name of Syr Darya has any etymological affiliation to *Silis*, at least it shows that Scythian already possessed an *l*-sound.

The Iranian suffix **(i/a/ā)ka-*

Furthermore, while the Iranian suffix **-ika-* formally corresponds to Greek **-iko-*, it became productive in the formation of nouns in Iranian languages,¹³ most often however in the form **-āka-*, **-aka-* (originally formed to stems in **-ā-* and **-a-*) or plain **-ka-*, and was typically added to words that would otherwise end up as monosyllabic. Thus, if a word **sir* or **ser* was borrowed into Alanic before the operation of the sound law, or while it was still productive, it is very likely to have quickly formed part of a new derivative **sirika-* which would then develop into **silka-*. It would have stayed as **silk(a)-* until it was finally picked up in Byzantium by Varangians and other traders from the North. Ciancaglini (2012a, 27–28 and 2012b, 95) describes the Old Persian use of the suffix by writing, “It seems that it occurs especially in toponyms and ethnonyms designating non-Iranian peoples, or peoples geographically distant or little known to the Persians”; among the examples, she mentions *Karka* adj. “Carian”, *Karkā* “Caria” where the suffix has been added to the original stem, but also, e.g., *Katpatuka-* m. “Cappadocian” where the final syllable in the foreign name seems to have been interpreted as the Old Persian suffix. It is conceivable that an ethnonym referring to “the (somewhat remote) silk people” could have spread via Old Persian areas even if it was formed in Scythian-Alanic as **Sili-ka-* “people of Silis, i.e., the area of Tanais and Jaxartes”. Based on what little we know about Scytho-Sarmatian and Alanic, we would at least expect a word **silika* “silk” to be homonymous with such an ethnonym (which, though hypothetical, is a possible productive formation). From the Black Sea inscriptions we now know the suffix **(a)ka-* also from Sarmatian names (Hinge 2005): Φλιμάνκος (*Flimánakos*), Φλειμνάγου (*Fleimnágou*), Φλείμνγος (*Fléimnagos*), Λιμνάκου (*Limnákou*) and Λίμνακος (*Limnakos*) all represent Scytho-Sarmatian **(F)liyamanak/gos*, where **(a)ka-* has been added to the Proto-Iranian appellative **frija-manah-* “liebgeistig; having a loving mind”¹⁴. The latter word, in turn, is attested in Sarmatian as Λείμανος (*Léimanos*) and in Modern Ossetian as *lymæn* “friend”. It may even be attested via the Scythian name of the Amazons mentioned by Herodotus, Οιορπάτα (*Oiorpata*) or Αιορπάτα (*Aiorpata*; with alternating diacritica) if Hinge is correct that ΟΙΟΠΠΑΤΑ is simply a corruption of ΟΙΟΠΓΑΤΑ < **aiuaṇaragāta* “one-breasted” (see Avestan *aēuuā-* “1” and *varah* “breast”).

Another possibility is that a loanword reflecting Greek *sērikón* was already around in Roman-Age Alanic and that the Alanic word was simply formed on the basis of a Greek model where the Greek suffix *-ikó-* was interpreted as the Iranian *-(i)ka-* (similar to Old Persian *katpatuka-* “Cappadocian” above). Even if we interpret Alanic **silka-* as a Greek loanword lock, stock and barrel, it could still have been borrowed early enough for the sound law to operate.¹⁵ It is also possible that after the completion of the sound law, new sequences of **-ri-* and **-rj-* were so slow to reappear that *-l-* simply was the realization of a phonemic sequence /ri/, /rj/ for some time – meaning that if the language absorbed a foreign word with **-ri-* or **-rj-* it would automatically have this sequence substituted with phonetic [l]. However, we know that this is no longer the case at least in Byzantine thirteenth-century Alanic where new cases of *-ri-* emerged from an old sequence *-raCj-*, cf. *zærin* or *zirin* < ζιρην > “yellow, golden” (Modern Ossetian *zærin*) < Proto-Iranian **zaranja-* (Cheung 2002, 104, 254; Engberg and Lubotsky 2003, 43).

A third possibility is that the culture word indeed entered Alanic from some other language than Greek, but a language which nonetheless already contained an unrelated suffix with **-k* given that such forms are already known in words for “silk” or “thread” from both Mongolic and Tocharian. Turkic in fact possesses a widespread suffix **-lek* (**-lak* after back vowels), which is already reconstructed in a textile term (Lubotsky and Starostin 2003, 261), namely Proto-Turkic **köjhe-lek* “shirt” (attested both in Modern Turkic languages and in loanwords in both Tocharian and Mongolian, and occurring in Altaic cognates with the meaning “silk”, “string” and “thread”). A Turkic form **sirlek* is likely to have turned into Alanic **silka* via **sirlika*. Also in this case the word could either have been interpreted by the Alanic borrowers as a completely foreign element and assigned a local phonetic rendering (**silka*), or it could have been reanalysed by the speakers as a local

formation with an inherited suffix (**sirl-ika* > **silka*), which is a perfectly normal development in loanword processes.

In any of these cases, the special Alanic sound law **-ri- > *-l-* plays an instrumental role. Despite the many uncertainties and possible subscenarios, it seems likely that the reason for the existence of the *-ilk-* form and its confinement to Northern and Eastern Europe is that it spread here via some stage of Alanic. Whether the derivative is formed with an Iranian suffix or has been borrowed with the suffix into Alanic from Turkic is less certain, as is its exact relationship with the Greek derivative, but it is important to note that the cultural and historical implications of all three scenarios are basically the same.

Golden silk – a reflex in modern Ossetian?

An Alanic **silka-* is not directly attested, not even in Iassic or Modern Ossetian. This is not a serious problem since the loss and replacement of lexical items in a given language is a phenomenon that takes place in all languages over time. However, it is interesting that the Modern Ossetian word for “silk”, while not corresponding regularly with the Alanic reconstruction, is at least superficially similar and has no known alternative source. It occurs both as *zældag*, *zældagæ* “silk” (Abaev IV, 294–295) and without the **-āka-* suffix as *zæly*, Digor *izæly* “silk; of silk, silken; silk scarf” (Cheung 2002, 254). According to Abaev, Digor *i-* here is simply the definite article although prothetic *i-* elsewhere can have other sources (a Proto-Iranian syllable **ja-* or the prepositions **ui-* and **abi-*).

Cases of Ossetian *z-* normally come from Proto-Iranian **z-* (e.g., *zærdæ* “heart” < Proto-Iranian **zarita-*, *zad* “born” < Proto-Iranian **zāta-*; *zæronð* “old, old man” < Proto-Iranian **zaranta-*). On the other hand, there are quite a number of Ossetian words of unexplained origin beginning with *z-*, e.g., *zaz* “yew, Taxus” and *zyng*, *zing* “burning, glowing hot coal; fire”. Some of these are in fact typical culture words that seem to have had an original *s-*, e.g., *zæppaz* “elevated or submerged grave chamber of stone”, if this is akin to Modern Persian *sabad*, Armenian *sap’at’* “basket” (see Cheung 2002, 254).

However, we would have expected Alanic **silka-* to develop regularly in Ossetian since Ossetian is a direct descendant of Alanic. One alternative possibility in the particular case of “silk” is that *zæly*, *zældag(æ)* can have been influenced by the precursor of Ossetian *zældæ* “young grass; grass; turf” (Cheung 2002, 253). This implies that the meaning must still have been “golden” at the time of reshaping, and we know that as late as Iassic this was still the case because the word has been borrowed into Hungarian as *zöld* with that meaning. “Golden” would then have referred to a particular golden type of silk garment, for example, Byzantine embroidery, or to the golden Muga silk type from Assam, which reached the West alongside Chinese silk, or simply to the value or the glistening appearance of silk in general.¹⁶ Such a contamination or folk-etymological reshaping could clearly have happened at any moment in the history of Alanic from the time of its absorption of the supposed silk-term **sirika-* till the semantic narrowing of *zældæ* from “golden” into “yellow grass”, since apart from the supposed Alanic loanword in surrounding languages, only the Modern Ossetian output *zældag(æ)*, *(i)zæly* is known.

Concluding remarks

No matter whether Ossetian *zæly* and *zældag* continue Alanic **silka-* or not, a hypothetical Alanic form remains the most plausible mediator between Central Asia and Old Norse *silki*, not least in view of the East Slavic attestations. Historically, this points to medieval trade routes on the Northern shores of the Black Sea. While the Alanic shape of the word seems to have reached Western Europe from at least sometime in the

seventh century AD (judging by the phonological shape of the Old English forms), it is possible that the Alans imported it northwards in several waves, and it might not have reached Old Norse until the ninth century, around the birth of Kievan Rus' and the first attestation of the word in Germanic literary sources.

As can be expected, the export of silk terminology from China westwards comprises not only the word *silk* but a range of terms from this domain whose exact meaning are not always entirely clear (see., e.g., Ching 2011 on Tocharian *kaum* and other terms, and Lubotsky and Starostin 2003, 261 on the cognates of Proto-Turkic **köjñe-lek*). Tracking the exact routes of such *Wanderwörter* and their chronology requires minute phonological and morphological analyses combined with facts and artefacts from cultural history.

Postscript

The starting point of this article was discussions I had with the Danish Balkanist Erik Thau-Knudsen, who had contributed an essay on the history of the word *silk* to the Danish National Encyclopedia (Thau-Knudsen 2000), of which I was the editor of etymologies at the time. He mentions briefly that Parthian could have been the source (interpreting the place-name *Silis* as Parthian), but, rather than reaching an actual conclusion, his essay mainly outlines the problem. Subsequently, Jens Elmegård Rasmussen (pers. comm.) suggested to us that Ossetian, with its frequent development of original **r* to *l*, might have played a role. On May 20, 2000, I presented some new ideas at a symposium at the University of Copenhagen (*Komparativ Sprogforskning på Vej*), saying that Alanic might have been the provider not only of the *l*-variants, but even the derivative itself. I supported this theory with the following three linguistic points: a) **(V)ka-* is a frequent nominal suffix in Iranian, b) the development of **r* to *l* was in fact older than Ossetian proper, and c) this sound law does not normally work for Iranian **r* alone, but involves a following **-i-* that we also find in the Greek “silk”-word. I reconstructed the same form **silika-* as Thau-Knudsen did, only not for Parthian but for Alanic, and was now able to account for both morphological and phonological developments on the basis of our knowledge of Iranian in general and Alanic in particular. Only at the very end of editing the present article did I discover that C. Gary Miller in his recent book *External Influences of English: From its Beginnings to the Renaissance* presents an almost identical solution (Miller 2012, 66–67), in fact with additional details: for example, he notes that *š* is regular in East Slavic borrowings from Old Norse. Miller suggests, too, that Ossetian *zæly* derives from **sīlika-* (which he reconstructs with long **ī*),¹⁷ however without explaining the irregularities or mentioning the important variant *zældag*. It appears to be time for etymological dictionaries to revise their entries on *silk*.

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Notes

- 1 Swedish is one of the very few languages that has two basic terms differentiating the silk thread (*silke*) from the woven silk (*siden*). The name of the Silk Road is called *Sidenvägen*, thus referring to the fabric.
- 2 South Saami *silke*, Pite Saami *silhke*, Lule Saami *silhkē*, North Saami *silki*, Inari Saami *silkke* (SKES IV, 1025).
- 3 The Balto-Fennic forms borrowed from Northern Russian are Eastern (Karelian and Ingrian) Finnish *sulku*, Karelian proper and Olonets *šku*, Lule *šk(u)*, Veps *šūk* (see Plöger 1973, 190). From Karelian proper comes

Skolt and Kildin Saami *šolkk*, while in Votic, the only Southern Balto-Fennic language to possess the word, *šolkka*, *šolkk* is borrowed directly from Standard Russian. Cf. SKES IV, 1103.

- 4 “Written Mongolian” (or Literary Mongolian) is the scholarly term for an independent Mongolian language variety, attested in the old Mongolian script and different from both Classical Mongolian and Middle Mongolian. Although documented from the Middle Mongolian period, it represents an earlier linguistic stage.
- 5 Cf. also Finnish *turkku* “fur” and Old Russian **torgŭ* “marketplace, square”, borrowed into Old Norse as *torg*. I do not necessarily embrace Wang’s (1993) idea that *Turk* and *silk* are ultimately etymologically identical, but in the light of a series of interesting loanword proposals showing an alleged loan correspondence **sVIC-* vs. **tVrC-*, the idea seems at least worth pursuing.
- 6 *Svila*, found in all South Slavic languages (Slovenian, Serbo-Croatian, Macedonian and Bulgarian), is technically unrelated since it formally seems to derive from a preverb **sŭ-* and the feminine of a participial form **vila* of the verb **viti* “to wind, to roll, to twist, to bend” (compare the modern Slovenian feminine participle *zvila* “bent”), but this is likely to be due to folk etymology (see Bezlaž 1995, 351 with references).
- 7 Russian *š-* is regular from *s-* in Nordic loanwords; thus, it seems more likely that the East Slavic terms have been borrowed from Old Norse (Miller 2012, 66–67).
- 8 Lat. *sērica* survives only via the Late Latin form *sareca* in Old French *sarge*, French *serge* in the meaning “twill worsted” or “twill silk”, and, via Medieval Latin *sarcia* and Old English *s(i)erc*, *syrce*, *s(i)erce* “shirt” in Old Norse *serkr* (Danish *særk*, Swedish *särk*, Norwegian *serk*) “undergarment of silk or flax canvas”. Today, the Danish word has either historical or pejorative connotations, depending on context; in the latter case, the meaning is less specific and can refer to any kind of loose garment. The directions of transmission involving Middle English *serk*, Modern English dial. *sark*, Old Church Slavonic *sraky*, *sraka*, *sračica* “garment”, Russian *soročka* “shirt”, Lithuanian *šárkas* “garment”, and Balto-Fennic forms like Finnish *sarkki*, Estonian *särk*, Livonian *serk*, pl. *sērkid* “shirt”, is not entirely clear (see de Vries 1962, 471 with discussion and references).
- 9 The exact relation of Pashto *sālū* “silk veil” and Modern Persian *sirah* to *silk* as well as to each other is uncertain (Cheung 2002, 254; Vasmer 1953–58, 387), but see below on other Iranian terms.
- 10 For further reference to the Icelandic saga, see *Íslensk Fornrit* XXVIII, ed. Bjarni Aðalbjarnarson, Hið Íslenska Fornritafélag, Reykjavík, 1951, p. 238; *Heimskringla: History of the Kings of Norway*, trans. Lee M. Hollander, Austin, 1964, p. 688.
- 11 When silk first occurs on the British Isles, simultaneous with the Old English velar umlaut of **siluc* to *seoluc*, see Miller 2012, 67.
- 12 The Sarmatian names Ἰρβιδος (*Írbidos*) and Ἰργανος (*Írganos*), attested in inscriptions from the Eastern part of the area North of the Black Sea, are perhaps also developments of **ārya-*, but they occur in the Western (“Scythian”) part as the variants Ἠλμάνου (*Ēlmánou*), Ἠλ[μ]ανος (*Ēl[manos]*), which may reflect a dialect continuum where the change into **l* was not yet completed in the Sarmatian area (Hinge 2005).
- 13 Except in Old Avestan where it is practically absent due to its low sociolinguistic connotation (Ciancaglini 2012a).
- 14 A compound whose elements correspond to Avestan *friia-* “dear”, Vedic *priyá-* id., English *free* + Avestan *manah-* “soul, spirit”, Vedic *mánas-*, Greek μένος (*ménos*).
- 15 A loan from Byzantine Greek could account for the *-i*-vocalism (Miller 2012, 67), but it is uncertain whether this is chronologically compatible with the consonantal development of **ri* to *l*. At least it would rule out a connection with the province of Silis because in this name the development of **r* to *l* would have taken place many centuries earlier.
- 16 In the tenth-century Old English medical work now known as Bald’s *Leechbook*, jaundice is said to cause the body of the patient to “turn yellow like good yellow silk” (*āgeolwap swā gōð geolo seoluc*, Biggam 2006, 3).
- 17 On the basis of Byzantine Greek /siriˈkon/: its length is indirectly preserved in Old Irish *síric* (via Vulgar Latin **sīrica*).

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Silk production and trade in the Roman Empire

Berit Hildebrandt

This contribution deals with the Roman perspective on the silk trade in antiquity as evidenced in Greek and Latin written sources.¹ The geographical scope comprises the Mediterranean area.² The time frame considered covers roughly the first century BCE to the fourth century CE. Our material is limited and chronologically disparate, though: apart from literary texts (that are dominated by moral discourses), we have the *Periplus Maris Erythraei*, a merchant's handbook for oversea trade with India, and inscriptions. So far, no Egyptian papyri have been found that deal with silk or the silk trade in the period in question.³ I will first discuss the terminology of silk in Greek and Latin and its implications for the existence and distribution of silk in the Mediterranean area. Then I will deal briefly with texts that give insights into the nature of the silk trade and the exchange with the East from the Roman perspective (see also the introduction to this volume), and information about the different qualities of silk that were available in the West. Finally, I want to turn to inscriptions that mention professions connected to silk and their implications for the production and trade of silk in the Mediterranean area.

The terminology of silk and its historical implications

The terminology for silk in Greek and Latin is problematic, but allows for some hypotheses about the introduction of silk in the Mediterranean area.⁴ As far as we can see, silk is not mentioned in our oldest Greek texts, the Linear B tablets that were written in Mycenaean Greek, or in the Homeric epics.⁵ The most common terms in later ancient texts were *bombycina* and *sericum*, in the plural *serica* (Greek σερικόν/*serikón*). The first instances of the term *serica* appear in texts from the second half of the first century BCE. Since the second century CE, we also encounter the term *métaxa* or *mátaxa* (μέταξα, μάταξα).

Today it is commonly assumed that the term *sericum* and its derivations – as well as the English word *silk* – derive from the Chinese word for silk, *se/sei*. It probably reached the European languages through transmission via the Altaic languages, i. e., through the languages of nomads traveling along the northern routes of the Silk Roads who were agents in the silk trade with Europe (Wang 1992–93, esp. 225–228 and 246–247; Hyllested, this volume).⁶ Pausanias offers an explanation that points in a similar direction by explaining that in the land of the *Seres* lives an insect that the Greeks call σῆρ (*sêr*), while the *Seres* themselves

had a different name for it (6,26,6). Pausanias' account implies as well that the Greek ethnonym for the people derived from the Chinese word for the silkworm. This in turn suggests that the Latin word *sericum* was a Greek loanword which would support the observation that many of the traders who arrived first in the Eastern Mediterranean at the end of the Silk Roads and who imported silk were Greek-speaking. The *Seres* are often translated into English as "Chinese", but this seems too narrow an interpretation because it focuses mainly on ethnological and geographical parameters. Literally, the *Seres* are the "silk-worm people" and thus could be any of the peoples unknown to the Romans who were involved in the exchange of silk along the Silk Roads.⁷ Furthermore, this translation has the advantage that it leaves the origin of the silk open and does not narrow it down to cultivated Chinese *Bombyx mori* moths. It also provides an explanation for the very mixed information that ancient authors had about the production and trade of silk: the texts may refer to different "silk people" in different climatic and geographic areas and also to different kinds of silk.⁸

The term *bombycina* derives from the Greek word for the silk worm, *βόμβυξ/bómbyx* (*LSJ* s. v.). The common notion is that *bombycina* were known since classical times and refer to fabrics made of an indigenous kind of wild silk that was produced in the Mediterranean area. This hypothesis is based on a passage in Aristotle's *Historia Animalium* that describes the life cycle of the silk worm and refers to the invention of silk production on the island of Cos by a woman named Pamphile. It is commonly accepted as belonging to the original text and thus dated to the 4th century BCE. Pliny refers to this information in his *Natural History*, dated roughly 400 years later (*Plinius maior; Naturalis Historia* 11,26,76). However, the attribution of the passage to Aristotle poses several problems. The next securely dated reference to *bombycina* is an inscription from Miletus that is dated to the end of the 2nd century BCE. It is a temple inventory that lists small silken clothing items like face-veils and headbands, the latter being registered as old and out of use (Herrmann *et al.* 2006, 213–215 no. 1357).⁹ Even if one assumes that the items identified as "old" must have been woven quite some time before the inscription was written, in Hellenistic times, the gap between Aristotle's text and the assumed time of production for the silk items cannot be easily filled. Especially if the silk items were fine and fragile, their conservation time would have been affected due to temperature changes, humidity and insects. The time gap has been seen by others (e. g., Blümner 1912, 202; Sherwin-White 1978, 242), but I think its significance has not been sufficiently addressed. Indeed, no other known classical text provides incontrovertible evidence for silk. Even the inventory of the sanctuary at Brauron that lists all kind of garments and is dated to the fourth century BCE gives no explicit indication of silk (Cleland 2005, 93–94).¹⁰ The same is true for classical Athenian comedies like those of Aristophanes, and also the comedies of Plautus in early Roman times.

The identification of early Mediterranean archaeological silk finds (Good 1995; 2011, see also Panagiotakopulu 2000 for the interpretation of the cocoon from Thera) are now likewise challenged (Bender Jørgensen 2013). References to silk that are attributed to Hellenistic times, such as a famous passage in Strabo (*Strabon* 15,1,20 p. 333 Casaubonus) that is assumed to refer to Nearchos, a general of Alexander the Great, or Florus' description of the silken and golden tents of Antiochus and the silken fluttering flags of the Parthians at the battle of Cannae (*Florus, Epitoma de Tito Livio* 1,24,9 [II 8]; 1,46,7 [III,11]) are likewise all mentioned in later Roman sources and thus suspect of being later projections into earlier times.¹¹

Furthermore, the story of Pamphile as the first inventor of silk processing stands out in the fifth book of the *Historia Animalium*, a book that is otherwise focused on zoological observations. All this casts doubt on the authorship and thus the dating of the passage as a whole in Aristotle, even if the argument at this point can rely only on circumstantial evidence until new finds appear. Regarding Aristotle, it seems that the passage falls into two parts: one with the description of the life cycle of the silk worm and another with the story about Pamphile on Kos, the latter maybe being a later insertion.

Moreover, the contents of this passage pose further problems. The correct description of the life cycle of

the silk worm in the *Historia Animalium*, as far as I can see, is matched only by later Roman texts when they closely refer to this text. Although *bombycina* are always correctly attributed to insects, the descriptions of the life cycles of silk-producing insects do not reach the precision of Aristotle in later times, especially when it comes to *serica*. This is shown, for example, by Pausanias' description: he seems to believe that the *serica*-producing insects lived 5 years and were then overfed until they burst so that the silk thread could be gathered from their insides (*Pausanias* 6,26,6). Furthermore, the vast majority of Roman authors are unsure as to whether *serica* derived from an animal or a plant (or both). Pliny, for example, in his explanations regarding *bombyx* silk worms (*Plinius maior, Naturalis Historia* 11,27,75–78) refers partly to the information given in the text of the *Historia Animalium*, partly to unknown sources. Some of his information could refer to silk moth species that were probably indigenous to the Mediterranean already in antiquity (Good 1995; 2011). Pliny's description of ash, cypress and oak as preferred trees on which silkworms lived would partly match the diet of wild silk moth species like *Pachypasa otus* and *Saturnia pyri* (Forbes 1930, 25).

Other information like that of the insects scratching a kind of “tree wool” from leaves in order to process it cannot be matched with any known zoological data. It is common in Roman literature, though, to attribute the origin of *serica* to “tree wool” from the very beginning of its mention (see, e. g., *Vergilius, Georgica* 2,121) until Late Antiquity, even if some of the ancient authors like Servius – who wrote a commentary on Vergil in the late fourth century CE – try to clarify that *sericum* was produced by certain worms living in trees that were called *bombyces* and thus cannot refer to “tree wool”; he also mentions that these worms were to be found with Ethiopians, Indians and *Seres*, which locates the origin of silk in the East (or along the routes to the East) even at this time (*Servius, Commentarius in Vergilii Georgica* 2,121). Still, that the confusion regarding the origin of silk existed even way into Late Antiquity seems particularly puzzling if one wanted to claim that an indigenous silk production existed in the Mediterranean area since classical times. If this is true, why did Pliny, for example, who often included first-hand information in his explanations, never look into all the contradictory reports about the origin of silk? Why did the confusion about the origin of silk last way into Late Antiquity? If there had been silk cultivation on Cos or in the Eastern Mediterranean area, authors could easily have compared their information with the actual practice of this cultivation. Even if the cocoons they could have found might have differed in size and appearance depending on the silk moth species, they would still have found an insect inside when cutting them open and thus would theoretically have been able to draw parallels.

To conclude, the evidence so far is not strong enough to make a reliable case concerning the dating of silk in the Mediterranean area, but in my opinion, based on the written sources, it cannot be excluded that the information about a classical silk production on the island of Cos is a later addition. Why the island of Cos was chosen is impossible to determine. I do believe though that the term *bombycina* carries knowledge about actual wild silk worm exploitation, because none of the texts describes silk as a plant fiber, which happens with other terms for silk, especially *serica*. Moreover, Roman legislation from the beginning of the third century CE differentiates between *serica* and *bombycina*, which also points to two different kinds of silk that could be distinguished.¹² Wild silk worms were probably not exploited in the Mediterranean, though – even though they might have lived there already in classical times (Good 1995; 2011) – but are rather to be sought further away in the East. Greek and Latin texts locate *bombycina* in Arabia (*Propertius, Elegiae* 2,3,15), Assyria (*Plinius maior, Naturalis Historia* 11,27,77) and the land of the *Seres* (*Gregorius Nyssenus, In Ecclesiasten (Homiliae* 8) 5,327,7). Servius, who placed *bombyces* in Ethiopia, India and at the *Seres* has already been mentioned. Besides the fact that ancient authors probably did not separate the terms for silk regarding different species and qualities as strictly as we would have liked them to have done, many of these indications of provenance seem to refer to ports of trade rather than places of production. New research has shown that Indian silk was probably in use already in the 3rd millennium BCE (Good *et al.* 2009 and Kenoyer, this volume), and is thus roughly contemporary with the earliest Chinese finds. India could therefore very well have provided both information about (wild) silks and early wild silk yarns and fabrics.¹³

This brings us to the next term that is often related to silk, the *Coae vestes*. It refers to very fine, often purple-dyed fabrics and is commonly believed to relate to the abovementioned passage in the *Historia Animalium* that gives the island of Cos as the place where the use of silk was invented. The term *Coae vestes*, though, is used nearly exclusively in Latin poetry in the comparatively short time span between the last third of the first century BCE (*Horatius, Sermones (Saturnae)* 1,2,101–102) and the 1st century CE (*Plinius maior, Naturalis Historia* 1, p. 34, 37–42 (Ian/Mayhoff)).¹⁴ Moreover, with the exception of Pliny, no author seems to explicitly connect the *Coae vestes* with silk, and none of the known documents that refer to silk in the context of trade transactions ever uses it. All this advocates its use as a poetical paraphrase for very fine, often purple-dyed fabrics that might sometimes have been made of silk (that came probably from the East) rather than a term for indigenous silk in the Mediterranean area.

Another word for silk that seems to be used from the second century CE on (*Aelius Herodianus, Partitiones* 125,10) is μέταξα/*métaxa*. Bárbara Pastor de Arozena suggested an interpretation as a composite of the Indo-European root for the word moth, μα-/ *ma-*, and -ταξα /-*taxa*, with the original meaning of “turning”, related to the Indo-European root for “constructing” and “weaving” (Pastor de Arozena 1994, 505). An etymological connection between the term and textile production was already made by Isidore of Seville, but with a slightly different emphasis (*Isidorus, Origines* 19,29,6). He mentions the term while talking about tools for the production of fabrics and clothing. According to him, *mataxa* is related to *metaxa*, which in turn is associated with winding threads around something (*a circuitu scilicet filorum*), because the Greek word *meta* is a term for the turning point on a race course (*nam meta circuitus*), and *mataxa/metaxa* is called this way because it is “transferred” (*trasferatur*). It has been suggested that this explanation is related to the prefix *meta-* that can express a kind of transfer in Greek, and therefore *mataxa* can be translated with “skeins of silk” (Barney *et al.* 2010, 389). Skeins of threads that were wound around two outstretched hands, for example, can indeed be likened to the oval of a race course. Another way of interpreting Isidor’s passage is that silk yarn was transferred to a spool that was used for tapestry weaving, for instance. This seems to have been suggested by Aelius Herodianus, who relates the word πήνη / *pêne*, which can be translated as spool, to *metaxa* (*Partitiones* 226, 12). Pliny mentions silk threads that are unraveled from the cocoons (literally the “wool-work”, *lanificia*) of the *bombyx* silkworm with the help of a spindle that was made from a reed (*Plinius maior, Naturalis Historia* 11,27,78), which would give yet another option for interpreting “transferred” silk. It can be concluded that *metaxa* seems to refer to silk yarn in the wider sense, be it silk skeins or threads that are wound around a spool-like instrument: the term does not seem to refer to a particular kind of silk, however.

Summing up, the term *serica* seems to have referred to silks that came from the East of the known world. Ancient authors are unsure as to whether this silk was a plant or animal fiber (or both). *Bombycina* on the other hand are always attributed to animals. Their origin is also sought in the East, with the notable exception of the story about the invention of silk production on the island of Cos. Finally, from the second century CE on, the term *metaxa* that seems to refer to silk yarns or skeins is used more often. This might mirror an increasing number of weavers in the West who were able to produce elaborate silk fabrics (for a discussion of the looms, see Wild 2008, esp. 473 with a revision of previous research results published in Wild 1987, and Sheng, this volume). We cannot assume though that ancient authors used all the terms for silk in a well-reflected manner and in accordance with modern textile specialists’ standards, as has already been stated. There were probably many who mistook a shiny, fine linen or cotton fabric for silk (and vice versa). What we can investigate, however, is how ancient texts talk about silk(s) and what they meant by and connoted with this material. With regard to trade, it does not seem a coincidence that terms for silk like *serica* and *Coae vestes* appear in the second half of the first century BCE (*bombycina* may have been in use already from Hellenistic times on, as outlined above). This was a time when the wealth of Egypt and the easy access to the Red Sea ports via Egypt came under the power and control of the Romans (McLaughlin 2010, 1).

Thus, at the current state of research, it seems impossible to establish a date for when silk was first known

and first produced in the Mediterranean. It seems possible that wild silk products like fabrics and threads – that might initially have come from regions further to the East, like India – spread in the Mediterranean area at some time in the Hellenistic period and that silk products from cultivated *Bombyx mori* silkworms that can originally be attributed to China came to the attention of ancient authors first during the first century BCE. But it seems safe to assume that both cultivated and wild silk were available in the Mediterranean area in Roman times. The first historical reference to the introduction of cultivated silk worms in the Mediterranean area (or rather their eggs) can be found in Procopius in the sixth century CE. He emphasizes the huge interest of Emperor Justinian I in obtaining direct access to silk, which was hitherto traded through territories controlled by the Persians, who were able to dictate the prices. Justinian purportedly aimed at military treaties with the *Homeritae* (Himyarites), a people in what is now southwestern Arabia, against the Persians and trade agreements with the Aethiopians, who were supposed to sell the silk (*metaxa*) they got from India directly to the Emperor (*Procopius, Bellum Persicum* 1,20,9). But neither alliance partner was able to keep these agreements. Procopius relates that Persian tradesmen, profiting from their geographical proximity to India, used to be faster than the Ethiopians in meeting the Indian ships at their anchoring places, thus allowing them to buy Indian goods including silk first (*Procopius, Bellum Persicum* 1,20,11–12). Therefore the transfer of silk-worm cultivation to the West seemed the best way to get rid of the disadvantages, risks and insecurities connected to the silk trade.

The nature of the silk trade according to Western texts

This example shows that access to Eastern silks in the West did not result from a direct exchange with Chinese or other merchants, but rather included innumerable intermediaries (see also Raschke 1978; Liu and Shaffer 2007; Liu 2010 and the introduction to this volume; Evers 2016). The flow of goods was unsteady and the quantities of silk available at any given time depended largely on the political situation(s) as well as geographical and climatic conditions along the main routes of transport (Thorley 1971; 1998). Modern models of supply and demand are thus inadequate for describing the exchange of goods in antiquity. It does not come as a surprise therefore that the ancient references to the nature of the silk trade are mostly opaque, especially since we have no information in papyri so far and must rely heavily on literary sources (the *Periplus Maris Erythraei*, a merchant's handbook from the first century CE, being the notable exception; it will be dealt with later). The literary texts rarely mention the nature of the exchange. Seneca talks about silk trade (*Epistulae morales ad Lucilium* 90,15: *commercium sericorum*) and in another place, about this trade being carried on with “people even unknown to trade” (*Seneca, de beneficiis* 7,9,5: *ab ignotis etiam ad commercium gentibus*). But we also find the concept of silent trade in Pomponius Mela. He describes the *Seres* as a very just people who conduct trade by leaving their goods in an abandoned place (*De Chorographia* 3,60,69,20). The exchange partners can pick up these goods and leave others in return. Mela hyperbolizes the qualities of the unknown *Seres* by endowing them with mythical peacefulness and shyness – which certainly is not true for the Chinese Empire, if the *Seres* were to be translated as “Chinese”, proving that he had no direct information about them. The *Periplus Maris Erythraei* gives sea routes from Egypt to India and mentions several ports of trade. However, as with other texts that were already mentioned, usually no clear distinction is made between the locations of the provenance of silk and the places of trade, and knowledge about the regions further to the East is rather limited, with the exception of Thina (see below).¹⁵ It is therefore very difficult to get much information about the trade routes to the East from the Roman perspective.

From the texts that we have, it seems that ancient authors were primarily concerned with the high prices for silk at their end of the trade routes. This is especially true for moralizing texts, where the Eastern luxuries are contrasted with a supposedly traditional, frugal Roman way of living: silk served as an excellent example in

this discourse.¹⁶ The high price of silk is emphasized by Pliny the Elder, who lists *sericae vestes* as well as pearls, diamonds, emeralds, nard and other luxurious items among the most precious earthly goods (*Plinius maior, Naturalis Historia* 37,204,78). The high value of silk is also addressed by Martial. In one of his poems he speaks about the most expensive things a beloved can wish for. Like Pliny he mentions nard and emeralds as well as sardonyx, gold coins and best quality silk (*Martialis* 11,27,11: *prima serica*).¹⁷ Moralizing authors also complain that silk was literally worth its weight in gold: in the *Historia Augusta* (that can probably be dated to the fourth century CE), it is claimed that Emperor Aurelian forbade his wife to use a purple silk mantle (*pallium*) because the value of a pound of (purple-colored) silk was equal to that of a pound of gold (*Scriptores Historiae Augustae, Aurelianus* 45,7). We know from other late antique sources that raw silk was indeed sold according to its weight. Origen gives examples for materials that are weighed in different weight units. He lists *metaxa* next to gold, silver and bronze (*Origenes, Expositio in Proverbia (fragmenta e catenis)* 17,212,28). Since weight was the parameter that defined the price, it would make sense to manipulate it when selling the silk in order to make more money or pay less.¹⁸ An ancient instance of manipulating the weight of silk might be found in a law that was promulgated under the reigns of Emperors Arcadius, Honorius and Theodosius in 406 CE. It forbade the delivery of unwashed silk, including purple silk (*sericoblatta*) and all kinds of raw silk (*metaxa*), to the imperial *aerarium* (*Codex Theodosianus* 10, 20, 13).¹⁹ The terminology for silk seems to refer to skeins of silk rather than finished fabrics and thus probably did not refer to the washing and finishing of silk garments that are mentioned in Diocletian's Edict (*Edictum Diocletiani de pretiis rerum venalium* 22, 8–15; see Granger-Taylor 1987, 119 with n. 28). It seems rather possible that the law was aimed at the removal of sericin since, as Huang Guo Rui (1998, 429) stated, “(t)he quantum of sericin in raw silk has a definite impact on the weight, cost and quality of silk fibre raw material.”

We get an idea about the maximum prices for different kinds of silk from Emperor Diocletian's Edict on Maximum Prices that can be dated to 301 CE. The Edict is a bilingual inscription in Greek and Latin that listed the maximum prices for services and goods, among them several textiles and textile raw materials, and was found in different parts of the Empire (though mainly in the East) (Lauffer 1971; Giaccherio 1974). The highest preserved price regards purple-dyed raw silk (*metaxablätte*) (*Edictum Diocletiani de pretiis rerum venalium* 24,1a). According to the Edict, it must not cost more than 150,000 *denarii* per Roman pound (which equals 327.45 g; see, e.g., Lauffer 1971, 54).²⁰ White, undyed raw silk was not to cost more than 12,000 *denarii* per Roman pound (*Edictum Diocletiani de pretiis rerum venalium* 23,1–1a), thus nearly 13 times less than the purple-dyed variant. As Ryszard Pankiewicz has stated, the 12,000 *denarii* given in the Edict equal 54 g of gold. Procopius gives 8 *solidi* for one pound of silk, which equal 36 g of gold (Pankiewicz 1985, 180). That means that one pound of purple-dyed silk could even equal the price of two pounds of gold. With regard to the quantity of silk, a silk thread at a length of 9 km weighs 3 g (Höllmann 2004, 72). Accordingly the length of 1 Roman pound of single-threaded silk yarn equals roughly 982 km.

An explanation for the extremely high price of purple-dyed silk can be the price of raw silk plus the very high price for the special kind of purple mentioned in the Edict, the so-called *blatta* purple, which was the most expensive kind among the Mediterranean varieties and became the privilege of the Emperor in Late Antiquity.²¹ It thus seems, judging by the terminology, that the silk was imported from the East while the purple dyeing took place in one of the facilities in the Eastern Mediterranean (see also a find of purple-dyed *Bombyx mori* silk in Palmyra: Schmidt-Colinet *et al.* 2000, 172, cat. no. 429, and Evers 2016, 76–77). This suggests that silk traveling along the Silk Roads could be subject to different steps of processing on the way. Furthermore, the references to the extremely high prices paid to the East for luxury goods like silk cannot be dismissed as mere rhetorical exaggerations: they seem, rather, to be grounded in actual commercial practices (see, e. g., *Plinius maior, Naturalis Historia* 12,84,41). This is probably also confirmed by an Egyptian papyrus that deals with loans for sea trade (papyrus SB 18/13167 = P. Vindob. G. 40.822, see the introduction to this volume; Seland 2007, 69–82; Konen *et al.* 2002, 137–138, 264–265; Meijer and van Nijf 1992, 127–128).

Although silk is not mentioned specifically, the papyrus shows the high financial risks of such an endeavor and the similarly high gains when the transactions were successful. The *Periplus Maris Erythraei* gives further insights into silk imports by sea from India to Egypt. It confirms that silk (*serika*) reached the Mediterranean not only in the form of already woven fabrics, ὀθόνιον (*othónion*) (translation after Belfiore 2004, 196), but also in the form of thread that might have been both spun and unspun, νῆμα (*nema*) and ἔριον (*érion*) (*Periplus Maris Erythraei* 39,9. 49,14. 56,13. 64,5 (Casson) – the textile terminology is not entirely clear: Belfiore 2004, 195 interprets *érion* as raw-silk floss). A difference between *metaxa*, silk skeins, and *serica* in the form of items of clothing as well as thread (*nema sericum*) is also made in a text from the time of Marcus Aurelius that regards taxes for goods from the East.²² The *Periplus* text does not give prices, but lists ports of trade like Barbarikon in Scythia, Barygaza in the northwest and Nelkynda, Muziris and Bakare in the southwest of India where silk products could be obtained, as well as other goods that were on offer in these locations and Western goods that could be sold in return. In most of the cases, the provenance of the *serica* remains unclear, though. The term might have referred to local Indian silks, but also to silk that came from further East. The latter is probably the case where *serica* from *Thina* are mentioned (*Periplus Maris Erythraei* 64, 5 (Casson)). They could very well have meant cultivated Chinese *Bombyx mori* silks.

Qualities of silk

This brings us to different qualities of silk. As previously stated, the terminology for silk suggests that both wild silk and cultivated silk were available. Furthermore, the poet Martial gives a hint of different silk qualities by mentioning “*prima serica*” (*Martialis* 11,27,11). The translation “first quality silk” is justified by the parallel use of *primus* in connection with fur, skin and wool qualities in other texts (see, e. g., *Edictum Diocletiani de pretiis rerum venalium* 8,1a.6a.23 *et al.*; see also *Plinius maior, Naturalis Historia* 12,65 who speaks of *primi, optimi, secundi, tertii*; for further examples see Morelli 2004). We cannot tell though what distinguished first-quality silk from that of second or third quality. Assuming that silk was judged analogous to other fibers like wool, characteristics such as the fineness and evenness of the thread, the natural color and the luster may have served as quality criteria (Blümner 1912, 99).²³ These features may have depended on different kinds of silk (wild and cultivated), or on the different silk qualities that could be obtained from one and the same cocoon (like the long, even threads wound around the middle of the cocoon – if it was not perforated by the hatching moth – or the shorter ones from the inner and outer parts that needed to be spun and thus formed an uneven thread). There is also a longstanding discussion about whether already-woven silk fabrics were unraveled and rewoven in the Mediterranean area (see, for example, Thorley 1971, 77 and the contributions of Liu and Feng in this volume). None of the Latin or Greek written sources can be irrefutably interpreted as proof for the unraveling of silks in the Roman Empire (Hildebrandt 2012b). A much-quoted passage in Diocletian’s Edict on Maximum Prices mentions persons who are “taking apart” silks: τοῖς τὸ σπρικὸν λύουσιν (*Edictum Diocletiani de pretiis rerum venalium* 23,2). From the philological point of view several interpretations are possible: the unraveling of silk cocoons, the rewinding of skeins of silk and the spinning of silk thread (Hildebrandt 2012b; for the spinning of silk in the Mediterranean area, see Wild 1987, 170; 1970, 51). Since in another passage the “taking apart” of purple-dyed silk is mentioned, the text probably refers to skeins of silk that consisted of already purple-dyed thread that was rewound or spun for further use (*Edictum Diocletiani de pretiis rerum venalium* 24,13). The group of persons who accomplished these tasks does not seem to have had a specific occupational title.

To sum up the argument so far, at the present state of research we know that silk was known in the Mediterranean region in the form of both woven fabrics and yarns, at least since (later?) Hellenistic times. The question of whether there was an indigenous silk production in the Mediterranean area or in the Near East

before the sixth century CE must at present remain open. The evidence might rather suggest the import of different kinds of silk. Silk could undergo different kinds of processing on its way to the West: it could, for example, be woven and dyed. Different silk qualities might have been related to wild and cultivated silks and/or to the different qualities of thread found in different parts of a silk cocoon. The price of silk fabrics (as for textiles in general) depended further on the weaving technique, the type of the final garment and, if applicable, dyestuffs and additional decoration like embroidery (see introduction).

At least from the end of the third century CE on, fabrics that consisted entirely of silk could be called *holoserica*, “100% silk” in modern terms, and were terminologically distinguished from “half-silk” fabrics, *subserica*, where silk was combined with other materials such as linen (*Isidorus, Origenes* 19,22,14). Diocletian’s Edict – this seems to be the first known text to use these terms – lists silk weavers who specialized in such fabrics that were made either completely or partly of silk and who mastered different weaving techniques like plain tabby and damasks (*scutlata* silks, see Wild 1964) (*Edictum Diocletiani de pretiis rerum venalium* 20,9–11). To give an example of the price of one of those silk garments in the Edict: a white half-silk *dalmaticomafortium*, a garment with sleeves and a hood, with stripes dyed with one pound of *hypoblatta*-purple, may not cost more than 44,000 *denarii*. The same garment made wholly of silk with stripes that were dyed with double the amount of purple was listed with a maximum price of 135,000 *denarii*, thus more than thrice as much as the half-silk variety with the less costly purple stripe (*Edictum Diocletiani de pretiis rerum venalium* 19,9–19; 20; 22,8–15; 24,13–15. For the prices of the *dalmaticomafortia* see *Edictum Diocletiani de pretiis rerum venalium* 19,12.16).²⁴

Just to give an idea of the value of such a garment: compared with the daily wage for a specialized silk weaver of damasks as listed in the same source, who was not to earn more than 40 *denarii* per day plus meals (*Edictum Diocletiani de pretiis rerum venalium* 20, 11), a weaver would have had to work continuously for more than 9 years to be able to buy a wholly silken *dalmaticomafortium* with high-quality purple stripes.²⁵ At the same time, the already mentioned persons whose task was connected to the preparation of silk yarn (*Edictum Diocletiani de pretiis rerum venalium* 23.2) earned 64 *denarii* per ounce of silk plus keep (1 oz equals 27.28 g according to Lauffer 1971, 54, which equals nearly 82 km of thread). It is impossible to estimate the daily wage of these workers because we do not know their exact task, but if we look at experiments for spinning wool where experienced spinners needed 7.5 hours to spin 14 g or 7.6 hours to spin 17 g of wool (Mårtensson *et al.* 2006, esp. p. 6 and appendix), we might at a very rough estimate calculate 1½ or 2 days’ work for spinning 27 g of silk thread (keeping in mind that silk thread was not necessarily spun and had very different qualities from wool fibers that certainly affected its handling). Assuming 2 days’ work, we would arrive at a daily wage of c. 32 *denarii*. Even if these numbers are off the mark, we might conclude that those silk workers were probably not able to purchase the precious silk themselves, but that the silk was provided for them by a principal. This again confirms the idea that high profit margins are to be sought in the trade with silk (as well as with other precious commodities).

Silk production and trade in inscriptions: The *sericarii*

This brings us to the term *sericarii* that designates people whose occupation was connected with *serica*, the kind of silk that was attributed to the remote people of the *Seres*. Here the term *sericarii* is used in its widest sense and is meant to include not only the female form but also variations such as *siricarii* or the Greek *seirikarioi*.²⁶ The textual evidence consists mainly of inscriptions. Unfortunately the low total number of texts does not allow insights into whether the use of the term differed regionally and diachronically. Moreover, many of the inscriptions were not found *in situ*. Where the provenance is known, though, we learn about the places where silk was processed and/or traded. Furthermore, we get information about the age, gender, ancestry and

social status of *sericarii*. The earliest inscriptions can be dated to the early first century CE and thus corroborate our earliest literary uses of the term that date from the second half of the first century BCE (Hildebrandt 2009). There is no modern consensus, however, concerning the occupation and tasks of the *sericarii*. While Joachim Marquardt and August Mau and then Hugo Blümner maintained that the terminology referred specifically to silk traders (Marquardt-Mau 1886, 498; Blümner 1912, 203; similarly Krauss 1928, 161), Karl Ernst Georges' Latin-German dictionary suggested that the term could also denote a "silk weaver" and in one epigraphical instance – to be discussed later – even a "preserver of silk clothing" (Georges s. v. *sericarius*). Liddell-Scott-Jones give in their Greek-English dictionary "silk-worker or silk mercer" (*LSJ* s. v. *σηρικάριος/serikários*). Other authors usually follow the translations as silk traders or weavers. The use of one of the suggested meanings poses problems, however. As Peter Kneißl (1983) has pointed out, traders and producers cannot always be clearly terminologically distinguished since the producers would often sell their own goods: thus, a *sericarius* might have woven his fabrics and then sold them. On the other hand, where *negotiatores* and *mercatores* are explicitly mentioned, the emphasis is placed on their engagement in trade. A *negotiator sericarius* was clearly indicated as someone trading in silk. In imperial times the terms *negotiator* and *mercator* seem to have become closer in meaning. *Negotiatores* were distinguished from *mercatores* by the formers' frequent travels or at least in sending out their employees. *Negotiatores* also sold their goods on a larger scale, sometimes operating from a centrally located storage facility (see also Amiri 2012, esp. 131–132). In some cases *negotiatores* probably also owned facilities where they produced the goods they were selling (Kneißl 1983, esp. 79–81). The exact meaning of the terms *sericarii* and *negotiatores sericarii* is thus not only of philological interest, but also addresses the organization and distribution of the Roman silk production and trade and helps us determine a *terminus ante quem* for specialized silk weavers and traders in the West.

Among those who supplied the Romans with silk was a certain Heliodoros of Antioch, son of Alexander, who is referred to as *sirikopoios* (literally "silk-maker"; *IG* 14,785: *ΗΛΙΟΔΩΡΟΣ ΑΛΕΞΑΝΔΡΟΥ ΑΝΤΙΟΧΕΥΣ ΣΙΡΙΚΟΠΟΙΟΟ*). Zoltán Kádár (Kádár 1967, 91) dated this inscription to the beginning of the 1st century CE, which would have made it one of the earliest inscriptions regarding silk. However, the palaeographic evidence that Kádár did not have suggests a date in the fourth–fifth century CE.²⁷ Kai Ruffing interprets Heliodoros as a "producer of silk fabrics" (Ruffing 2008, 745; also Liddell-Scott-Jones s. v. *σιρικοποιός* translate as "silk manufacturer").²⁸ We cannot tell whether Heliodoros could also have been involved in the preparation of silk threads or yarns. Significantly, the inscription bearing his name was discovered in Naples, and is written in Greek. We know that the stone – which probably originated from Puteoli – was re-used in the construction of a later building. In Heliodoros we have the story of a specialist who relocated from one of the largest Syrian trading cities to one of the most important trading ports with the East in Italy (Young 2001, 60).

A marble tablet found in Rome and dated to the beginning of the 1st century CE by Kádár (*CIL* 6, 9892; Kádár 1967, 90),²⁹ acquaints us with *Thymele Marcellae Siricaria*, "Thymele, *siricaria* of Marcella". The Greek name, which is well attested for Rome (Solin 1996, 543), and its connection to a Roman woman – Marcella – suggests that we are dealing with a person who is a servant and a slave. Marquardt and Mau interpreted Thymele as a slave who supervised the silk clothing of her mistress (1886, 497 n. 5). In Georges' aforementioned lexicon (s.v. *sericarius*) she is regarded as a "keeper of silk clothes (in Rome), and slave of a Roman woman". Jean-Michel Poinssotte also chooses this translation (1979, 457 n. 115). The *Oxford Latin Dictionary*, however, sees Thymele as "a woman who deals in silk" (s. v. *sericaria*). The linking of Thymele to Marcella does not support the view that the former traded in silk, though: rather, given the sophisticated system of service in affluent Roman households, it suggests that she was one of the highly specialized household servants, one who took care of the silk clothing and maybe even other silk items that belonged to her mistress. Kádár even suggests that Marcella could have been the wife or sister-in-law of Agrippa, which would make Thymele a slave connected to the Imperial family (1967, 90).³⁰ Whether she was also able to weave silk

remains to be seen.³¹ Two poems by Martial shed further light on the potential tasks of a *sericaria*: he recommends pinning up wet hair when wearing *bombycina* garments in order to avoid sullyng them (*Martialis* 14,24,1–2). Maybe one of a *sericaria*'s tasks was to clean stained silks. Martial also talks about the silk dress of the Empress that comes out of the presses of the Palatine (*Martialis* 11,8,5). Technically, it is not probable that Martial refers to silks that were prone to wrinkle and thus had to be smoothened out, as we might assume today on hearing the word “clothes press” (though it is very well imaginable that silk textiles were smoothened with a tool like a hot stone and that this was the responsibility of a servant). In this case, we might rather think of a press that was used to introduce creased folds into garments that were very fashionable in Roman times (Granger-Taylor 1987). We even have archaeological evidence of a big wooden press in Herculaneum, but that was probably used rather to dry cloth (Ulrich 2007, 57–58).

Another *sericaria* by the name of Data is attested in a Roman tomb inscription (CIL 6, 9891). Data had erected the stone for her partner and herself after the middle of the 1st century CE (maybe even in the second century CE).³² The text reads: *D(is)•M(anibus) / Claud(io)•Bacchylo / v(ixit)•a(nnos)•XLIX / Data•sericar(ia) / cont(ubernali)•b(ene)•m(erenti)•et•sibi / cons(tituit)*, translated “To the gods of the Underworld. Data, the *sericaria*, built this tomb for her well-deserving partner Claudius Bacchylos, who lived 49 years, and for herself.” The *nomen simplex* Data and the man's Greek name as well as his classification as *contubernalis* indicate that the couple were originally slaves. At least the man must be regarded as a *libertus*, a freedman.³³ The stone itself had served another function before becoming Bacchylos' gravestone, which suggests that the couple did not have a particularly high income. Data might well have had a social status similar to Thymeles and either looked after silks in a wealthy household and/or produced them.

That the activities of *sericarii* were of a manual nature is corroborated by later literary sources like Ephraem Syrus in the fourth century CE (*Ephraem Syrus, Sermones paraeneticus ad monachos Aegypti* 48, 41) and the *Eparchikon biblion* that is dated to the 9th century CE (8,5,1; 8,6,1; 8,10,1; 8,12,1; see also 6,10,2). The latter (8,8,1) explicitly contrasts the *serikarios* with the *metaxoprates*, the trader in silk yarns.³⁴ Another important source is the already mentioned Edict on Maximum Prices. It discusses wages of *plumarii* (tapestry weavers: Wild and Droß-Krüpe forthcoming) and *sericarii*, who might have been put in one category because both deal with very intricate textile techniques that included or could include silk. *Sericarii* dealing with half-silk fabrics received the maximum of 25 *denarii* per day plus meals, those working with whole-silk plain fabrics, also 25 *denarii* plus meals, and those working with whole-silk *scutlata* fabrics/silk damasks received 40 *denarii* (*Edictum Diocletiani de pretiis rerum venalium* 20,1.9–11, see also discussion above). The distinction between different weaving techniques and raw materials as well as the verb *ergázomai* (that literally means “to work / to do”), strongly indicates that these *sericarii* were weavers. The term can include both male and female persons. It seems that the technical skills concerning the weaving of plain half-silk and whole-silk fabrics (probably tabbies) were comparable because these *sericarii* earned the same wages, while those producing *scutlata* silks or damasks needed more expertise. Maybe these *sericarii* were specialists who came to work in the workshops or *domus* of the elite, but they might also have produced silk fabrics on demand in their own houses. This is hinted at by the verb *ergázomai*, mentioned above, that designates work for other persons in the Homeric epics and from Classical times on, also production for sale (Wagner-Hasel 2000 b, 319 n. 29), but also because the Edict lists different kinds of looms for the weaving of silk fabrics in another part of the text.³⁵

The maximum price for a loom for weaving whole-silk *scutlata* fabrics – that is, silk damasks (Wild 1964) – including wooden accessories is indicated as 750 *denarii*. This entry is followed by one for a loom for half-silk fabrics with complete wooden equipment, the price of which is unfortunately not preserved. Further very fragmentary information concerns looms for linen fabrics, whose prices are also missing, as well as other textile tools. The meaning of these prices is difficult to interpret. John Peter Wild has discussed the possibility that they were meant as prices for the purchase of the looms. His interpretation is corroborated by the heading

of the chapter “on wooden objects” that is matched by the items listed, like looms, “every instrument of wood” (a phrase that is also used for loom sales in papyri) and flat rods. Moreover, as Wild has argued, a walnut bed had a maximum price of 400 *denarii* and a damask loom with all wooden equipment had a maximum price of 750 *denarii*, which is a reasonable price relation for two elaborate wooden items (Wild 1987, esp. 465). Another price range evolves when one looks at contemporaneous papyrological evidence: an Egyptian second-hand loom was indicated at c. 3250 *denarii*, although that might have been proof of the inflation that Diocletian’s Edict was anxious to stop (Wild 1987, esp. 465–466, and pers comm). This leads to the question of who would have been interested in buying a whole loom: it could have been the weavers or the owners of a large *domus* or of workshops that provided everything for the weavers, from tools to raw materials. However, one wonders whether these cases were so numerous that the looms merited a separate entry in a text that was supposed to regard regulations for the whole Empire.

Given that in the Edict the headings do not always match the contents closely³⁶ and that it also lists wages for weavers and very detailed prices of different items, one wonders whether another interpretation might also be possible. A lot of garments were probably woven on demand (Droß-Krüpe 2011a, 173–174; 2011b). This is especially true for those with more intricate patterns like the above-mentioned *scutlata* silks, which could have easily exceeded the resources of textile home production (unless one includes the large *domus* of the elite as well). This means that the production of the textile was given into the hands of external weavers. In this scenario, the price that is mentioned for the looms might not have been meant to designate the price for buying the whole loom, but rather for installing it and/or setting it up for weaving certain kinds of fabrics and garments. It is not specified whether the price would comprise the raw materials needed,³⁷ but given the high prices for silk in the Edict and the fact that only wooden equipment is mentioned in the text, and in analogy to papyrological contracts that refer to linen and wool, we have to assume that the silk had to be paid for separately (Droß-Krüpe 2011a, esp. 173–174; for silk, see also Wild 1987, 471). The question of whether the Edict refers to the price of looms or the price of setting them up cannot be decided at the present time. At least it is safe to assume that a high price for the setting up and the mounting of a loom is plausible since this task, using fine silken warp threads, required specialized skills and was very time-consuming and thus costly. The specialists were probably called *serikodiastai* (σηρικοδιασταί). The term is a *hapax legomenon* attested in the *Historia Alexandri Magni* in recensio γ (*Ps.-Callisthenes, Historia Alexandri Magni, Recensio γ liber 2,35a, 8 line 7*). Neither in literary texts nor in the epigraphical or papyrological record have we found any parallels so far. The term is mentioned in the context of a luxury discourse that mentions gold, silver, servants, stately houses and culinary delights, but also silk clothing. Liddell-Scott-Jones translate *serikodiastēs* (σηρικοδιαστής) as “silk weaver” (*LSJ* s. v.). But the term *diázomai* (διάζομαι) is very specific: it designates the mounting of warp threads on a loom.³⁸ The literal translation of the passage would thus be, “You dress yourself in a soft way, like the silk worms who warp the silk threads.” Such a translation would corroborate the widespread ancient idea that the silk worms wove their own cocoons – that could be likened to a tunic – like a fabric (see, e. g., *Plinius maior, Naturalis Historia* 11,27,77). Moreover, it sheds new light on the *chaîne opératoire* and specialization within the silk production, even though the dating of the passage is difficult. A work division in silk weaving at least at the time of the Edict would not be astonishing, though, given the density and fineness of the archaeological silk fabrics. Wild mentions Roman silk damasks with 40 to 50 warp threads per centimeter, and as many weft threads (Wild 1987, 461). Armin Selbitschka gives an example for a garment made of mulberry silk that was found in a tomb in Niya in the Tarim basin. It is a long, red, silken garment on a female mummy. The width of the fabric was 51 cm and the density of warp threads, 54 threads per centimeter. That means that more than 2700 warp threads had to be mounted (Selbitschka 2010, 151). It seems possible, especially looking at later epochs, that the mounting of the loom was carried out by specialists who were called in for this task, and that the silk weavers then began to work.

Such a weaver or supervisor of weavers is probably the *siricarius* whom we encounter on a marble

gravestone, probably erected in the second century CE.³⁹ The stone was found in Tivoli, the classical Tibur, in Latium. The inscription reads: *D(is) · M(anibus) / M(arco) · Nummio / Procuro · siricario / Valeria / Chrysis / coniugi · optimo / benemerenti / fecit* (CIL 14, 3711), translated “To the gods of the Underworld. Valeria Chrysis built it for her most excellent and well deserving husband, Marcus Nummius Proculus, the *siricarius*.” Here we have a man who is labeled as *sericarius*. He is probably not a slave, but a Roman citizen, because he was able to marry legally as the term *coniunx* implies (Treggiari 1991).⁴⁰ Judging by her Greek name, his wife was probably a freedwoman. We are fortunate as well to know of the burial monument that her husband commissioned for her: it is a sizeable marble *cippus* with a well-executed inscription (CIL 14, 3712).⁴¹ These two marble funerary monuments suggest that this *sericarius* was not a man of modest means. It seems that silk guaranteed him a good income in Tibur, and it is probably not by chance that he settled in a place that was favored by the wealthy Roman elite (also the summer residence of Emperor Hadrian was located there), who were able to commission the precious fabrics. It is possible that M. Nummius Proculus had servants or slaves who worked for him, for example as silk weavers, and whose products he then sold on, but we learn nothing about it from the inscription.⁴²

Another, spectacular inscription proves that huge profits could be made in the silk trade. It originates from a silk trader (*negotiator sericarius*) named Aulus Plutius Epaphroditus and was erected on the 15th of May 168 or 169 CE.⁴³ The large marble tablet, probably a building inscription, was found in Gabii in 1792, and is at present housed in the Louvre in Paris (Inv. no. Ma 1562). It reads:

Veneri Verae Felici Gabinae / A(ulus) Plutius Epaphroditus accens(us) velat(us), negotiator sericarius templum cum / signo aereo effigie Veneris item signis aereis n(umero) IIII dispositis in zothecis et / (v=)bal(v=)bis aereis et aram aeream et omni cultu a solo sua pecunia fecit cuius ob / dedicationem divisit decurionibus sing(ulis) |(denarios) V, item VIvir(is) Aug(ustalibus) sing(ulis) |(denarios) III, item tabernariis intra murum negotiantibus |(denarios) I et HS X m(ilia) n(ummum) rei publ(icae) Gabinor(um) intulit ita ut ex / usuris eiusdem summae quodannis IIII k(alendas) Octobr(es) die natalis Plutiae Verae / filiae suae decur(iones) et VIvir(i) Aug(ustales) publice in triclinis suis epulentur quod si / facere neglexserint(!) tunc ad municipium Tusculanor(um) HS X m(ilia) n(ummum) pertineant / quae confestim exigantur loc(o) dato decreto decur(ionum) / dedicata Idibus Mai(i)s L(ucio) Venuleio Aproniano II L(ucio) Sergio Paullo II co(n)s(ulibus).

In the translation of David M. B. Richardson, based on Jörg Rüpke,⁴⁴ it reads:

To the *Venus Vera Felix* of Gabii. Aulus Plutius Epaphroditus, *Accensus velatus*, silk merchant, had this temple built from the ground up at his own expense, including a bronze Venus, four bronze statues installed in niches, bronze doors, a bronze altar, and all cult accessories. On the occasion of the dedication, he distributed five *denarii* to each individual town councillor, three *denarii* to each of the *seviri Augustales*, and one *denarius* to each of the merchants active within the city walls. He donated ten thousand *denarii* to the municipality of Gabii, so that the town councillors and the *seviri Augustales* might use the interest accrued to hold a public banquet on his dining sofas every year on 28 September, the birthday of his daughter Plutia Vera. If, however, they should neglect to do this, the ten thousand *sestertii* will immediately be forfeit, to pass to the municipality of Tusculanum. The land (for the temple) was made available by decision of the town council. All this was dedicated on 15 May under the second consulates of Lucius Venuleius Apronianus and Lucius Sergius Paullus.

Aulus Plutius Epaphroditus was probably a freedman who had clearly done well as a silk trader with far-reaching connections, a *negotiator sericarius*, and who enjoyed an excellent reputation in his community. In honor of his deceased daughter Plutia Vera, he had commissioned a sanctuary to Venus including a cult

statue. His own name (Epaphroditus) demonstrates the affinity he felt towards this deity.⁴⁵ This silk trader was so wealthy that he could not only donate the whole building, but also bronze statues, bronze doors and a bronze altar, and was still able to hand out money and provide a public fund, the interest of which was to pay for an annual public banquet on his deceased daughter's birthday. He was firmly rooted in his local community and emphasized his function as *accensus velatus*, a position that was probably of a mainly religious nature, and part of the *cursus honorum* of distinguished freedmen. Bassir Amiri mentions that freedmen were very often connected to the huge senatorial families for whom they conducted business, perhaps even acting on behalf of the Emperor in acquisitions of goods (Amiri 2012, 129–131). We learn from another inscription, also found at Gabii, that Aulus Plutius Epaphroditus had several slaves, at least some of whom he had manumitted and who had erected a monument in his honor.⁴⁶ What remains of it is a quadrangular marble statue base with the text *A(ulo) · Plutio · Epaphrodito / accenso velato / negotiatori · sericario / liberti · patrono / ob ·merita · / eius*, and translation, “To Aulus Plutius Epaphroditus, *accensus velatus*, the silk trader, (from) his freedmen to their patron for his merits.” We do not know for sure whether these freedmen were related to the silk trade of their patron or any kind of silk production, but it is possible. But it is clear that the financial resources of Aulus Plutius Epaphroditus far outstrip those of the *sericarii* whom we have considered thus far.

As a successful silk trader, *negotiator sericarius*, one could evidently amass enormous wealth. From other sources we know that the large profits resulted among other things from the risks that a merchant had to face when he engaged in long-distance trade: the profits were great when the goods actually reached their destination safe and sound (Ruffing 2007, esp. 45–46; Young 2001, esp. 19, 22; Thorley 1971). It is also imaginable that this trader relied on a network of contact persons both in the Eastern Mediterranean and in the harbors in Italy who might have guaranteed him a right of pre-emption for the silk products that actually reached the Mediterranean area.⁴⁷ He might also have employed slaves or craftspersons who were experienced in weaving silk and who could turn imported silk threads into fabrics and clothing.⁴⁸ Furthermore, as Amiri has shown (2012, 138–143), the name *Plutius* is quite common in Rome and the center of Latium, more precisely around Gabies and Tusculum. The large number of *Auli Plutii* and *Lucii Plutii* suggests ties, maybe in the form of clientele, between these persons. Next to a *plumarius*, a tapestry weaver, there are also other occupational titles connected to luxury textiles, like a *purpurarius*, a purple-dyer. Amiri interprets this result as an indication of a large network of clients that was connected to families who specialized in certain branches of trade (2012, 139).

We do not know of any association of *sericarii* so far, but an inscription from Rome supports the idea that *sericarii* could jointly donate monuments. An inscription is written on the shaft of a column that was found in the gardens on the Quirinal hill. It reads,⁴⁹ *SERICARI·D·D / Sericari(i) d(ederunt) d(edicaverunt)*, translated as “The *sericarii* donated and sanctified it”. Admittedly this votive gift was far from the aforementioned donation of a whole temple, but this monument indicates that several *sericarii* were active in urban Rome at the same time and joined forces for dedications. Again the text does not indicate in what way these people were connected with silk. We can also assume that silk traders of Christian or Jewish faith were active in Rome: this is suggested by a tombstone that was re-used in a church in Rome.⁵⁰ The deceased is a certain Paulus who is described as *olosiricoprates*, a trader of wholly silken fabrics. Without knowing the provenance of traders like Paulus, one wonders whether he might have been an agent who operated between Rome and the Eastern Mediterranean. He might have maintained personal business contacts in a huge city like Rome where the wealthy elite desired precious silks.⁵¹ In a world without integrated markets, he might have served as a middleman between his contacts in the Eastern Mediterranean and Rome.⁵²

Another silk trader is Marcus Aurelius Flavius in Rome, whose gravestone describes him as a *negotians siricarius*, a silk trader.⁵³ His *praenomen* and *nomen gentile* probably indicate that he was awarded Roman citizenship under the *constitutio Antoniana* in 212 CE.⁵⁴ The stone is unfortunately reused and the inscription

is thus no longer fully intact: — / *coniugi* / *sanctissimae* / *M(arcus) Aurelius Flavius* / *negotians siricarius* / *vivo(=u)s fecit et sibi*. Translated: “... for his most revered wife Marcus Aurelius Flavius, the silk-trader, built it, during his lifetime, and also for himself.” The inscription was written on a marble funerary altar that must have been quite costly and points again towards the profitability of the silk trade.

Outside Rome and Italy, a Jewish *σρηκάριος* / *sirekários* is mentioned in a Greek epitaph in Beirut (*Berytus*).⁵⁵ The monument is dated to the second half of the second century or the first half of the third century CE.⁵⁶ Samuel’s son Kandedos and a woman named Deborah erected his monument. While Samuel and Deborah have Jewish names, the name Kandedos could present a Hellenized version of the Latin name Candidus. Linda Jones Hall suggested that they were a family who moved between different cultural spheres (2004, 224), which would have been advantageous in the field of silk production and trade. Ruffing mentions that according to the Talmud, Jewish traders were central to the silk trade in Mesopotamia and Syria (2002, 367; see now also Evers 2016, 79–81). This family could thus be an example of the international and intercultural connections of people involved in the silk trade (see also Ruffing 2006, 138). It is probably not by chance that these *sericarii* were found in Beirut, one of the largest trading cities in Syria, like Antioch where the aforementioned Heliodoros came from. Also Procopius mentions Berytus and Tyrus as famous centers for the production of silk garments “from ancient times on” from where the silks were traded “to the whole world” and where many tradesmen and craftspeople were living (*Anecdota* 25,14–15). Finally the spectacular silk finds in Palmyra, a trading center on one of the main caravan routes that testify to both Chinese imports and locally produced fabrics should be mentioned.⁵⁷ However, the poor workmanship of the letters of the inscription (“*lettres mal gravées*” according to Waddington 1870, 443) could indicate that Samuel, whilst not penniless, was nowhere near as wealthy as the silk trader Aulus Plutius Epaphroditus. One could assume that his main occupation was rather that of a weaver, or that at least he was not a trader on a larger scale.

Finally there are two fourth-century epitaphs that mention Christians who worked as *siricarii*. The first, a small marble stone in Rome, simply reads: *Felicissimus* / *siricarius*.⁵⁸ His tomb was situated in the tomb complex of a certain Domitilla, which points to his status as a servant in a rich household. Further, Felicissimus must have been a craftsman as evidenced by the hook-like instrument that is depicted on his tombstone that might represent a pin-beater.⁵⁹ He might have been responsible, like the above-mentioned Thymele, for the silk clothing and fabrics of his mistress, and he seems to have been able to weave silk. The other inscription was found in Trachones in Attica in Greece. It was a small Hymettian marble gravestone that was erected for one Dionysios *syrikarios* and reads,⁶⁰ *Μνημόριον Διο/νυσίου συρικαρίου οἰκαίτη τοῦ / λαμπροτάτου / Πλουτάρχου ἀν/θυπάτου*, translated as “To the memory of Dionysios, the *syrikarios*, a slave born in his master’s household, the most respectable governor Plutarch.” This Plutarch is otherwise unknown (Bayet 1878, 395–397 tab. xiv 2). Dionysios is also characterized as *oikaítes*, that is, as slave-born in his master’s household. Obviously he is not a trader, but probably like Thymele mentioned above, a slave of the *familia* of a member of the Roman elite who performed a specialized task in the household: the keeping and maintenance (and perhaps also the production) of silk clothing and textiles.

As a result of the survey of *sericarii* and related terms, we can conclude that persons dealing with silk can mainly be found in major port and trading cities where the silk from the East arrived, as well as in Rome and its surroundings where the wealthy elite lived. Inscriptions and literary texts reveal different occupations connected to silk that seem to become more and more specialized from at least the third century CE on: next to persons who “take silk apart” (which could refer to the unraveling of cocoons or rather to turning skeins of silk into yarns), we have indirect proof of silk dyers, weavers who specialised in different techniques like tabbies, damasks and tapestry and specialists who mounted the looms. It seems that the large *domus* employed *sericarii* who can probably be understood as specialized slaves and servants of both genders whose main function was to take care of the silk textiles of their masters and mistresses and maybe even to produce and/or mend these

silks. They do not seem to have been involved in trade transactions, especially when they were unfree. Another group of *sericarii* can most likely be seen as silk weavers who produced silk fabrics and probably also silk clothing.⁶¹ In all probability they took in orders and sold their produce, but they do not seem to have been traders *per se*. Someone like the *sericarius* M. Nummius Proculus might have dealt with silk fabrics on a larger level and even have employed slaves as weavers, but he is not distinguished as a *negotiator* or as *negotians*.⁶² Two *sericarii* (Aulus Plautus Epaphroditus and Marcus Aurelius Flavius) are unambiguously indicated as being traders by the words *negotiator* and *negotians*, respectively. As Kneißl has pointed out, the terms *mercator* and *negotiator* denote the same occupation in Imperial times, namely, the trade with goods that are often specified, like silk (1983, esp. 75). Like M. Nummius Proculus, they are attested in Rome or in the vicinity of the capital, where the desire for luxury goods like silk was high.

The case of the *negotiator sericarius* Aulus Plutius Epaphroditus, who was probably a freedman, shows how much wealth a successful silk trader could amass. As shown by Amiri (2012), he might have relied on networks that were provided through family ties and clients. For an idea about the importance of family ties in textile production, we can also look briefly at the production of silk ribbons in early nineteenth-century Saint Chamond, in the southeast of France. As Elinor Accampo (1989) states, the skills were passed on within families since the silk-ribbon production “required lengthy apprenticeship, highly developed skills, dexterity, patience, and, for the best ribbons, a true artistic talent” (21). Men, wives and children were all involved, and often the production of silk ribbons would be a family enterprise that also relied on the intermarriage between silk weavers’ families (21, 25–27). A master weaver could own three to six looms on which he, his family and journeymen could work to satisfy the demands of merchants who put in orders and provided the material. Tasks like winding bobbins or spinning and warping the silk for merchants could be carried out by children and women, while the weaving was often the task of the man and maybe journeymen (21–22). The unraveling of cocoons was an arduous task often carried out by young girls who were not well paid. The silk strands could then be twisted and placed on skeins, both in the home or in a workshop (22–23). The skeined silk then went to a miller who “threw” the silk and turned the skeins into yarn: that was mostly a female task carried out in workshops (23). The silk yarn then went to a dyer who scoured and cleaned the silk that was still in skeins. It was the task of warpers to lay all the strands parallelly with equal tension, which required a great amount of skill and practice as well as patience and was accordingly better paid (24). After the warping, both warp and weft were sold to the weaver who wove silk ribbons based on the orders of the purchaser (24). Mounting the loom for weaving silk ribbons could take from one day to more than a week (25). Again, we cannot be sure that the processes were comparable to those in antiquity, but the example gives an idea of the skills, time and resources needed.

The noticeably widespread Greek-derived names in the inscriptions point towards persons who immigrated from the Greek East as well as slaves and freedmen of Greek descent, but also houseborn slaves.⁶³ However, it seems that specialists in silk were often connected to the east of the Empire where the silk trade routes ended. That is also true for Jewish silk traders. Maybe at least some of the *sericarii* had personal networks that granted them favored access to the silks that reached the Mediterranean at a time when the flows of commodities were unsteady. It is surely not by chance that the different cities that are mentioned in the inscriptions are all connected to important trade routes. People who were part of the trade and production of silk seem to have been located in places where the silks from the East arrived and where they were consumed. Ruffing (2014) suggested that Syria, with the Palmyrene traders in particular, played an important role in the silk trade. Branches in Rome or Puteoli might have connected these traders from the East with customers in Italy. In contrast, the trade with India as evidenced by the *Periplus Maris Erythraei* was carried out mainly by Egyptian traders with a Graeco-Roman background and Campanian families whose slaves and freedmen served as agents.

While the above-mentioned examples shed some light on the provenance of silk traders and weavers and

the flow of goods when customers ordered specific garments, we have only very scarce evidence pertaining to silk markets. It is again the poet Martial who mentions that first-quality silk was available in the *vicus Tuscus* in Rome (*Martialis* 11,27), a street that started in the Roman forum and that was famous for the perfumes and clothes that were sold there – in Paul Barié’s and Winfried Schindler’s words, it was like a kind of shopping center (1999, 1389 *ad Martialis* 11,27,11). Whether the silks were bought in the form of yarns or fabrics probably also depended on the wishes of the customers for custom-made fabrics and garments by specialized weavers or, as Martial lets us know, for a quickly-bought, precious present for one’s mistress. In Late Antiquity the Emperors attempted to monopolize both the economic benefits of the silk production and trade (and its properties as rewards for subordinates or diplomatic gifts) as well as the use of certain kinds of (often purple-dyed) silk garments that became insignia of their power and status.⁶⁴ As a general rule, those who could organize the trade through their personal networks were able to make a huge profit, while those who were dealing with the material as craftspersons were usually people of modest means in comparison.

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I have profited greatly from the comments of many colleagues over the years, and from the feedback of the peer reviewers. I want to thank Peter Rothenhöfer who kindly and generously read and commented on this version as well as an earlier manuscript concerning the inscriptions of *sericarii* in 2009, Kasper Grønlund Evers, Mechthild Müller, Katharina Colberg and Ellen Harlizius-Klück for discussions related to silk and Carole Gillis for her valuable comments on the draft versions. Regarding Greek and Latin texts, I am grateful to Peder Flemestad and in particular Boris Dunsch, who has most generously and helpfully shared his knowledge with me over many years. The translations given are my own unless otherwise stated. Any errors that remain are my sole responsibility.

Notes

- 1 For comprehensive discussions of the texts from Imperial times and especially for a focus on the consumers of silk, see Kádár 1967; 1968; Hildebrandt 2009; 2012a. The dating of ancient texts follows von Albrecht 1994, if not otherwise indicated.
- 2 For the Roman view on connections beyond the Mediterranean area, see the introduction to this volume.
- 3 Droß-Krüpe 2011a, 25.
- 4 A more extensive study of the terminology will be presented in Hildebrandt (in preparation).
- 5 Pionati Shams 1987; for Linear B, Panagiotakopulu 2000, 77–79; for precious textiles in the Homeric epics, Wagner-Hasel 2000a.
- 6 The ethnonym “Türk” is, according to Wang 1992–93, 247, also related to silk, its original meaning being the “silk people” or “the silk dealer”.
- 7 The *Seres* were also famous for trade in fur and iron: *Plinius maior, Naturalis Historia* 34,41,145 and 37,78,204.
- 8 One example is the “silent trade” that Pliny attributes to the *Seres*: *Plinius maior, Naturalis Historia* 6,21,54. Faller 2000, 94–96 suggests that these *Seres* refer to the inhabitants of modern Sri Lanka. See also the introduction to this volume.
- 9 I thank Peder Flemestad for this reference.
- 10 The fragmentary state of the Brauron inscriptions can play a part, but it is difficult to explain the absence of any recognizable term in any inscription over such a long period of time. Another factor might have been that Miletus had more far-reaching connections than Brauron and was thus able to amass more exotic items. I thank one of the peer reviewers for this comment.
- 11 These texts are often taken literally, something which should at least be questioned at the current state of research. E. g., Thorley 1971, 71 seems to take Florus’ report as proof that the Parthians were already acquainted with silk.

Even if the dating seems possible (see also Good 2011, 218 and the comments made above on the spread of silk in the Mediterranean area during later Hellenistic times), further research needs to be done.

12 *Ulpianus Digesta* 24,2,23,1 and *Pauli sententiae* 3,6,79. See Nardi 1984, 79.

13 Already Marquardt and Mau 1886, 494–495 discuss different kinds of silk worms from the East.

14 The term may be indirectly referred to in some Late Antique texts: *Isidorus, Origines* 19,22,13 writes about *bombycinum* that is made on the island of Cos, but does not use the term *Coae vestes*. *Prudentius, Liber Cathemerinon* 7, 156 refers to a garment dyed with *coos murices*, i.e. *murex* shells, but does not specify its material (I thank Lisa Eberle for this reference). A more comprehensive discussion of the material regarding *Coae vestes* will appear in Hildebrandt (in preparation).

15 It has to be noted though that the picture varies according to the sort of texts: the aim of the geographers was different from that of the poets, who used ethnonyms and toponyms more freely. On this general topic, see most recently Nedungatt 2010.

16 These texts cannot be taken literally, as Catherine Edwards has shown (Edwards 1993), but rather as attempts at challenging a person's character and thus his or her ability to fit the roles of a political leader or a good wife, for instance.

17 Silk and nard are also mentioned together by *Plinius maior, Naturalis Historia* 21,8. Regarding the translation of “*prima serica*” as “first-quality silk”, see discussion below.

18 Today silks can undergo a treatment with mineral salts or artificial resin to make them heavier, but this is to ensure easier handling: after the thorough removal of sericin, a gelatinous protein that serves as a kind of natural glue to keep the two fibroin filaments that form the silk fiber together, the silk becomes very light (Völker and Brückner 2001, 44).

19 In the case of undyed silks, the sericin added to the weight. In the case of purple-dyed silk, we have to assume other substances that might have been added during or after the dyeing, as the sericin was probably thoroughly removed beforehand to make sure that the very expensive dye took as well as possible (see, e. g., Soundarapandian (ed.) 2007, 179). For the same reason it would not be advisable to dye silk threads that are still wound around the cocoon: not only do they form different layers, but the sericin prevents the dyestuff from penetrating the fibers evenly.

20 It is not possible to go into the controversial discussions about the target groups of and motivations for the Edict. With regard to the prices, we can assume that in regions without strict control the law would not necessarily have been obeyed.

21 For different kinds of purple, see, e.g., Reinhold 1970 and Steigerwald 1990a; 1990b.

22 *Digesta* 39,4,16,7; Nardi 1984, 80; Ruffing 2014, 72.

23 For modern quality criteria that include “neatness, cleanness and evenness”, see Shekar and Hardingham 1995, 34–35.

24 A comparison of prices in the Edict that are related to silk items in particular and textiles and textile raw materials in general is still a *desideratum*.

25 Morelli 2004, 56 gives as equivalents for the cost of one silk garment in Late Antiquity 12 years of work, or a quantity of grain that would last one person for 70 years, or a quantity of oil and wine for 30 years.

26 We also find other terms for persons who dealt with silk, like *oloseriscopratai*, persons who bought fabrics made wholly of silk, and *metaxarii*, persons who were dealing with silk yarns. A thorough re-examination of these terms has to be reserved for another article.

27 I. Napoli II,122 (Miranda 1995, 49). I thank Kasper Grønlund Evers for this reference.

28 This also leads to the question of when we have to assume occurrence of tools, especially looms, in the Mediterranean area that were adapted to the production of different kinds of silk fabrics, see, e.g., Wild 1987; 2008.

29 For a photo of the inscription see: [http://db.edcs.eu/epigr/bilder.php?bild=\\$Gordon_00045.jpg](http://db.edcs.eu/epigr/bilder.php?bild=$Gordon_00045.jpg).

30 Aristocratic households and in particular the Imperial household employed many specialized servants who were, among other things, in charge of clothing and textiles: see in general Winterling 1999, 106–107 and for examples, Wagner-Hasel 2002, 331–335 as well as Treggiari 1973; 1976.

31 Peter Rothenhöfer did not exclude this possibility (pers comm 09.09.2009).

32 For a photo, see: <http://db.edcs.eu/epigr/bilder.php?bild=PH0002910>. Kádár 1967, 96 does not give a date; Vicari

suggests a time after the middle of the 1st century CE (2001, 97). Amiri (2012, 130) assumes that he was awarded Roman citizenship under Emperors Claudius or Nero. Solin 1996, 112 proposes the second/third centuries CE. Rothenhöfer states that the opening formula *D(is) M(anibus)* indicates a date most probably after the middle of the first century CE, but because of the formula *v(ixit) a(nnis/os)*, the second century CE seems more plausible (pers comm 09.09.2009).

33 Rothenhöfer, pers comm 09.09.2009.

34 See also *Hermes Latinus, De triginta sex decanis* 25,1,5, a fifteenth-century Latin translation of a Greek compilation of different texts that lists *sericarii* among *sapientes*, *artifices*, *architectores* and *mechanicos*. See also Pexenfelder (1670) chap. xxxix, p. 212: *Textores sericarii texunt sericum*. I thank Mechthild Müller for this reference.

35 The text is preserved only in Latin: *Edictum Diocletiani de pretiis rerum venalium* 12,32a-33.

36 Admittedly the fragments of the chapter on looms are very consistent so far, but chapter 13, for example, that also deals with textile tools, gives a much more difficult and inconsistent picture (Flemestad *et al.* forthcoming).

37 To calculate the price for the threads needed to mount a loom, we would need the measurements of the loom, something which is difficult to establish. The price also depended on whether the warp was made of silk or linen or wool, and whether, if it was silk, it was a plied yarn (and thus heavier and more expensive than a single thread). For possible measurements of looms, see Wild 1987, 469–470.

38 *LSJ* s. v.: “set the warp in the loom, i. e. begin the web.”

39 Vicari 2001, 97: after the middle of the first century CE. Based on a very rough assessment of the formula, Rothenhöfer (pers comm 09.09.2009) would place it in the timespan between the end of the first and the middle of the second century CE.

40 This is assuming that Valeria Chrysis used the term in its legal meaning, which did not necessarily have to have been the case: see, e.g., Toohey 2014, 106.

41 The text reads: *D(is) M(anibus) / Valeriae / Chryside / M(arcus) · Nummius / Proculus · siricarius / coniugi · suae / optimae · b(ene) · m(erenti) · fecit*. Photo: [http://db.edcs.eu/epigr/bilder.php?bild=\\$CIL_14_03712.jpg](http://db.edcs.eu/epigr/bilder.php?bild=$CIL_14_03712.jpg). Kádár 1967, 96.

42 Amiri (2012, 130) assumes he is a craftsman who got rich rather than a trader *strictu sensu*.

43 *CIL* 14, 2793. Amiri 2012; Rüpke 2004; Kádár 1967, 96; Kádár 1968, 84. Regarding the problems in assuming a Venus temple in Gabii, see Harvey 1989, 302.

44 Rüpke 2014, 27–28. For a German translation see Rüpke 2004, 73–74; for a French translation, see Amiri 2012, 132–133.

45 On his name, see Amiri 2012, esp. 137, 139.

46 *CIL* 14, 2812. Kádár 1967, 96. Papin and Roger 2008, 214 date it to the second half of the second century CE; on the context see also Rüpke 2004; Amiri 2012, 127–129.

47 I thank Beate Wagner-Hasel for this suggestion.

48 Regarding the organization of textile workshops in Egypt, see Droß-Krüpe 2011a, esp. 151–190.

49 *CIL* 6, 9890. See now also Evers 2016, 77–78.

50 *CIL* 6, 9893. Vicari (2001) does not give a date.

51 The famous Doctor Galen, who recommended silk threads for the ligation of blood vessels, remarked that silk could be best found in huge cities where it was sought after by rich ladies: *Galenus, Methodi medendi* XIII 22; *De cognitione* 9. See also Kádár 1967, 97.

52 Peter Fibiger Bang (2008) has made a strong argument for personal, clientele-like structures in long-distance trade. Taco Terpstra (2013) has supported a model of foreign agents in Rome who kept close contact with their home communities. See also the introduction to this volume.

53 *CIL* 6, 9678. The size of the stone is unfortunately not indicated, but regarding its form, see below.

54 It is less probable that he was a freedman of Emperor Marcus Aurelius or Commodus. Another indication for a dating to the second/third century CE is the superlative *sanctissimae*: I thank P. Rothenhöfer for these comments. Also Amiri (2012, 130) interprets him as someone who was awarded Roman citizenship under Marcus Aurelius or Commodus.

55 Waddington 1870, 443, ad 1854 c.: Τόπος διαφόρων
Σαμουήλου υἱοῦ Σαμουήλου σιρ[ηκ]αρίου. Κανδ[έ]δας υἱὸς καὶ Δεβωρᾶς. δ. Underneath the text is a

depiction of a seven-armed candelabrum. Translation: “This tomb belongs to Samuel, the son of Samuel, the *sirekarius*. Kandedos, his son, and Deborah (have erected it/had it built/had it erected).” The ending of the text, a *delta*, is unexplained.

- 56 Kádár 1968, 81 suggests Severian times.
- 57 On the textile finds, see Schmidt-Colinet *et al.* 2000; regarding the meaning of Palmyra, see Ruffing 2014, 72–74 with n. 18 and the introduction to this volume.
- 58 *ICUR (Inscriptiones Christianae Urbis Romae)* 3, 7583. Epigraphic Database Bari: <http://www.edb.uniba.it/epigraph/23905>. A picture can be found at: [http://db.edcs.eu/epigr/bilder.php?bild=\\$ICUR_03_07583.jpg](http://db.edcs.eu/epigr/bilder.php?bild=$ICUR_03_07583.jpg)). We encounter another Christian *siricarius* in: *T(itum) Abvidiacum / Primum / siricarium* (Sinn 1987 no. 216); unfortunately the inscription is of unknown origin.
- 59 For a photo see: [http://db.edcs.eu/epigr/bilder.php?bild=\\$ICUR_03_07583.jpg](http://db.edcs.eu/epigr/bilder.php?bild=$ICUR_03_07583.jpg). I thank Peder Flemestad for his suggestion that the object could be a pin-beater.
- 60 *IG* 3,2 3513 = *IG* II² 13445. Bayet 1878, 112 no. 102 gives a height of 25 cm and a width of 32 cm.
- 61 Since many ancient clothing items like cloaks, togas or tunics were based on rectangular or circular shapes, there was often not a big difference between weaving a fabric and a garment. See for example Croom 2010.
- 62 Kneißl (1983) stresses that a trader was not necessarily identified as such terminologically.
- 63 A Greek name does not necessarily point to a provenance from the Greek eastern part of the Empire, since houseborn slaves were often given Greek names. I thank P. Rothenhöfer for this comment.
- 64 For the legislation, see Nardi 1984; on the use of silk in antiquity, see Hildebrandt 2009; 2012a.

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Perspectives on the wide world of luxury in later Antiquity: silk and other exotic textiles found in Syria and Egypt

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I look outward from the Eastern Roman provinces farther east beyond the frontiers toward fabulous places with their exotic luxury goods (Fig. 5.1). My perspective on this wide world of luxuries locates silk among other textiles that may be identified as exotic at a given site by their imported material, rare weaving technique, style of clothing or, my main concern, distinctive ornamentation. I begin in eastern Syria with selected textiles of the second and third centuries from the well-documented sites of Dura Europos and Palmyra, which I compare to roughly contemporaneous textiles from other sites, including Karanis in the Fayum in Egypt; I then turn to later examples from Antinoë and Panopolis in Upper Egypt. Luxury textiles from these sites furnish evidence for cosmopolitan tastes and inter-related markets throughout this period, from the second to the seventh century, as Syria and Egypt remained two of the wealthiest provinces of the Empire partly because of their roles in long-distance trade. Taking up a broader and more speculative outlook inspired by Liu Xinru's *Silk and Religion: An Exploration of Material Life and the Thought of People, AD 600–1200* (1998), which considers commerce as a vector for the spread of religion, I propose that such textile finds may reflect conceptions of the cosmos that incorporated trade in luxury goods from the east.

Dura

Known as Europos during earlier periods of Hellenistic Greek and Parthian Persian rule, Dura entered the sphere of the Roman frontier in the second century CE not as a caravan city but as a small *polis* populated mainly by Roman military including a cohort from nearby Palmyra as well as locals. Its military role was to guard traffic on the roads and the Euphrates River to ensure the remarkable mobility of people, goods, and capital (Leyerle 2009, 110) that characterized the Empire throughout Late Antiquity. Roman Dura looked in *all* directions: to the Persian threat to the east just across the Euphrates River, and to the river itself and its traffic linking north and south. From Dura, routes led to the Persian Gulf and west all the way to the Mediterranean. In consequence, Dura has been recognized since its discovery as a vibrantly multi-cultural hub, a character it retained until its final mid-third century destruction caused through a long siege by the Persians (Brody and Hoffman 2011).

Textiles found at Dura reflect the diverse character of this settlement and its access to trade goods. Just over 300 textiles were found on the embankment along the city wall and towers and in some tombs of the abandoned Citadel. These textiles, which are fragmentary and show signs of hard wear and patching, are mainly plain and tapestry weaves in wool (e.g., Figs. 5.3–4). Dark purples, blues, reds, and yellows are the most common colors, and they were made with common dyestuffs (Pfister and Bellinger 1945, 4 and 6). The only gold thread (Yale University Art Gallery, hereinafter YUAG, 1938.5692) was found in a small bundle and the core for the thread is missing, so perhaps, as suggested by Rudolf Pfister and Louisa Bellinger in their publication of the textile finds, this thread is what remains from a cloth that had been burnt to recover the valuable gold (Pfister and Bellinger 1945, 60).

Although Durene textiles were mostly local products, several exceptions offer evidence of a local market for imported materials. One of these exceptions is a fragment with imported undyed cotton (identified as “Levantine” rather than Indian cotton) weft threads, belonging to a trio of large fragments of what may have been a tent (YUAG 1929.504; Pfister and Bellinger 1945, 52–53). The silk of two small fragments from the site would have been imported as well. One was described as fine monochrome brocade, that is, with patterning made by a supplementary weft.¹ The other silk is a compound weave, that is, a fabric structure with more than two sets of elements, more than one warp or more than one weft system (Fig. 5.2) (YUAG 1933.486; Pfister and Bellinger 1945, 52–53). Bellinger identified its silk fiber as Chinese and the spun threads (strong twist to the right) and weft-faced, compound-weaving technique as characteristic of Central Asia and Syria, speaking of a compound cloth: one main, one filling warp and two wefts carried at a time, as well as of red, tan, and undyed silk, rather than the unspun, warp-faced compound-weaving technique characteristic of China (Pfister and Bellinger 1945, 53; additional discussion at 1–3 and 9). This piece is well preserved thanks to a history of careful treatment (Snow 2011, 39) and much studied, although with few uncontested conclusions (Vogelsang-Eastwood 1988, 209–211). Recently, Zhao Feng identified the design, two geometrical, angular patterns on parallel stems, repeated in red on undyed silk and undyed on tan silk, as characteristic of Han-period China, and identified the cloth as a silk taqueté, i.e., tabby or plain compound weave, with a “Han-style” design, likely originating in China (Zhao 2004, 70). This is in contrast to Krishna Riboud’s earlier characterization of the design as “non-Chinese” and “inspired by a tapestry pattern” (Riboud 1975, 155; see also Sheng 1999, 147–168). This piece may be early (third-century CE) evidence of weft-faced compound weaving produced on looms that were developed for their capacity to be set up to repeat precisely the same design (Vogelsang-Eastwood 1998, 374–430; Muthesius 1997, 22; Wild 2003, 141). It has a technique indicative of emerging technology, a design that resists easy attribution, and imported material: in many ways, this was an exotic textile for Dura.



Fig. 5.1: Sketch map including places mentioned in the text (drawing by the author).

Another piece from Dura was characterized by Pfister and Bellinger as imitating in tapestry weave a repeating diaper pattern of a floral motif repeated in rows that regularly alternate their spacing, “making a diagonal as well as a linear pattern” like those associated with popular compound-weaving designs (Fig. 5.3) (YUAG 1934.469; Pfister and Bellinger 1945, 38–39, cat. no. 138). Unlike the marked regularity of compound weaves, in tapestry weaving discontinuous wefts were “drawn” freehand, resulting in irregularities in pattern, tension, and surface texture.

Brocading, compound weaving, and its local imitation in tapestry are unusual among the clothing and cloth furnishings from Dura, and entirely absent from paintings of textiles at the site. Textiles and depictions of cloth from Dura present traditional styles of loose-fitting Roman tunics utilizing solid-color ground fabrics with symmetrical arrangements of thin weft bands in solid colors, usually paired, and geometric motifs (Fig. 5.4). Although there is a dearth of Parthian Persian material culture from Roman Dura, the visual arts often do depict Persian-style ornaments such as arrowheads, and close-fitting, Persian-style tunics with a wide ornamental band arranged vertically along the center of the torso (Fig. 5.5). Such garments may well be represented among the textile artifacts, but the pieces are often so fragmentary that we cannot be certain they belong to garments (Fig. 5.6). Of the furnishings from Dura, one large wool blanket (or hanging), reused as a shroud, was ornamented with continuous weft bands of solid colors (Fig. 5.7) (YUAG 1938.5683; Pfister and Bellinger 1945, 34, cat. no. 116). Numerous textile fragments further attest to the frequent occurrence and variety of solid-color bands (Fig. 5.8).



Fig. 5.2: Silk in a weft-faced compound plain weave with multi-colored bands and repeating bands of an angular motif in alternating colors. From Dura Europos, early to mid-third century (© Yale University Art Gallery, Dura-Europos Collection, 1933.486; used by permission).



Fig. 5.3: Fragment of weft-faced wool tapestry weave with repeating motifs in an overall diaper pattern. From Dura Europos, early to mid-third century (© Yale University Art Gallery, Dura-Europos Collection, 1934.469; used by permission).

Indeed, a wide range of ornamental bands is found among the Durene finds. Shaded weft bands well known among the finds from third-century Syria are especially indicative of cosmopolitan tastes, as Annemarie Stauffer has shown (Stauffer 2007; Pfister and Bellinger 1945, 9), and of expense through the use of the valuable dye – kermes – and imitations of valuable dyes (Koren 1999). Typically at Dura these bands modulate between dramatic contrasts of deep colors meticulously combined in the dyeing of the fleece and spinning of the yarn and may be combined with other motifs (see Fig. 5.9). In one variation (Fig. 5.10), modulation between bands was accomplished by alternating picks of color combinations (e.g., from red-tan to red-blue) in the center rows framed by registers of bands in solid colors. The silk compound weave (Fig. 5.2) might be

included in the category of shaded bands because of its sophisticated juxtapositions of the close tonalities of tan and undyed silk, although the design is not related by motif or color scheme to the most common types of shaded bands. Shaded bands combined with bands of vegetal motifs have third-century, contemporaneous counterparts, for example, in Western China, where they were utilized in narrow pieces of cloth for second- to third-century boots from Niya, which typically employ a brighter color scheme of “rainbow stripes” including pink and light blue (Fig. 5.11) (Mair 2011, 198; Sheng 2011; Zhao 2002; Schorta 2001, 101–103). There is a similar aesthetic at work that accommodates, as Stauffer has argued, the adaptation of a Syrian design; such adoptions and adaptations of motifs and designs contributed to an expanded ornamental repertory employed across vast territorial distances and cultural realms.

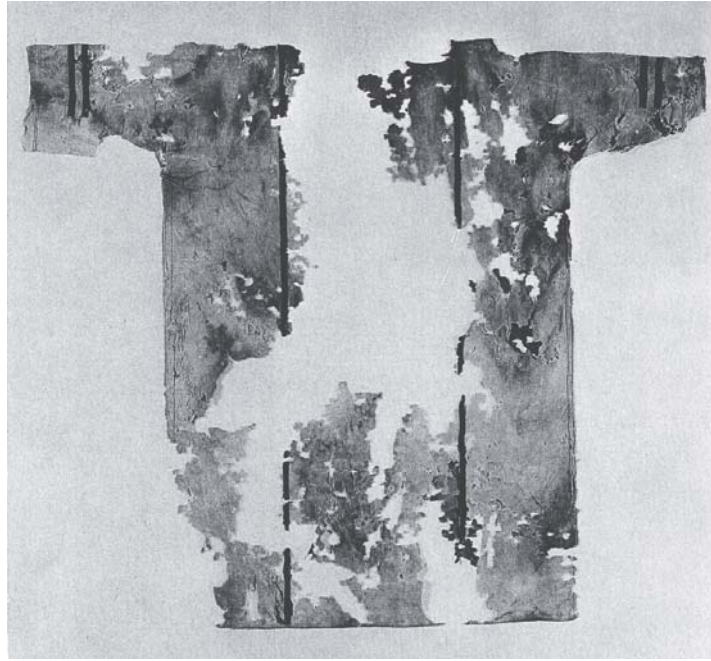


Fig. 5.4: Wool tunic with purple clavi and cuff (welt) bands. From Dura Europos, early to mid-third century (after Pfister and Bellinger 1945, pl. v; © Yale University Press; used by permission).



Fig. 5.5: Fragments of a wall painting of Mithras and Sol. From the Mithraeum at Dura Europos, early to mid-third century (© Yale University Art Gallery, Dura-Europos Collection, 1935.99a-s; used by permission).

Textual and archaeological evidence also indicate that textile designs with shaded bands were produced in numerous locations and traded widely. Maria Mossakowska-Gaubert identified the term *skiotos* in a first-century sailing itinerary for the Red Sea, *The Periplus of the Erythrean Sea*, as referring to shaded bands (2000, 312). In addition to the artifacts from China, Egypt, and Syria are examples from Palestine and Central Asia

(Koren 1999; Schorta 2001) and a furnishing (cushion cover?) with brightly colored shaded bands in wool and cotton found at the Nubian site of Qasr Ibrim in a Roman-Meroitic context (British Museum EA72334; excavation registration number 1990,0127.503). Among the 3500 textiles found at the Roman town site of Karanis in Egypt, many of the sixty-five examples of locally produced shaded bands adopted a strikingly subdued color scheme of browns and tans, sometimes with designs added in weft-wrapping similar in appearance to brocades (Fig. 5.12); one example of three small pieces sewn together (Fig. 5.13) is executed in brighter colors closer to the color schemes of the boots from Niya and the variation from Dura (Figs. 5.10 and 5.11).

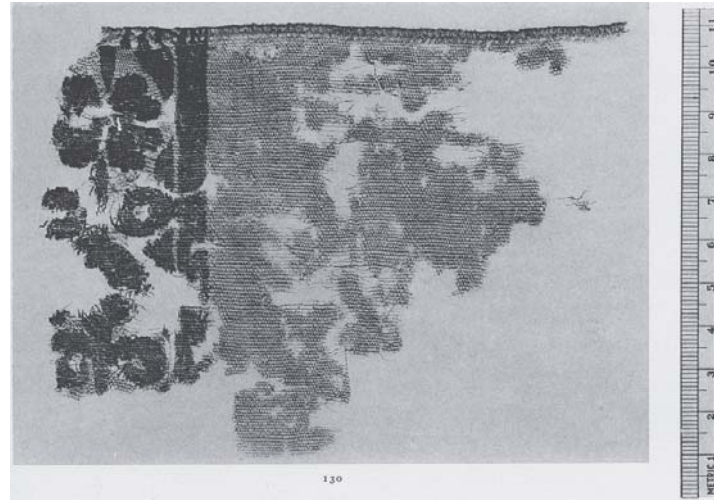


Fig. 5.6: Fragment of weft-faced wool tapestry weave with a band of vegetal motifs. From Dura Europos, early to mid-third century (after Pfister and Bellinger 1945, pl. xix; Yale University Art Gallery, Dura-Europos Collection, 1938.5683; © Yale University Press; used by permission).

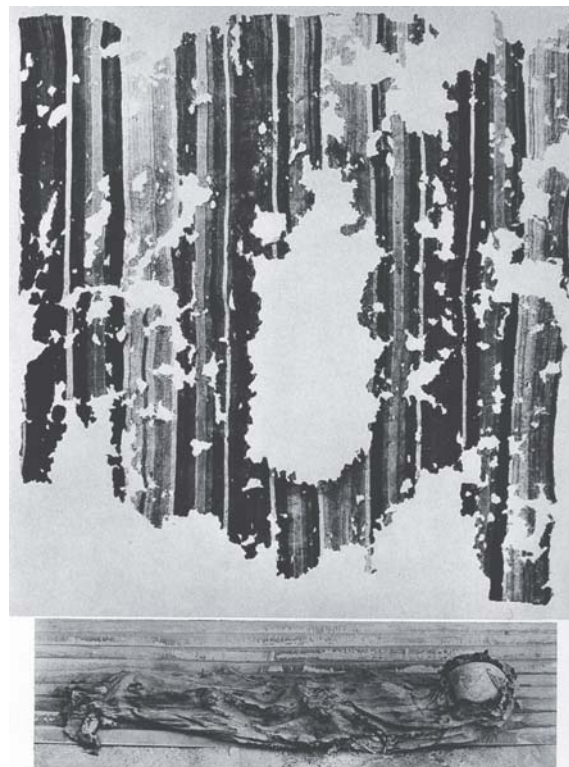


Fig. 5.7: Shroud, wool, plain weave with multi-colored weft bands. From Dura Europos, early to mid-third century (after Pfister and Bellinger 1945, pl. xvi; © Yale University Press; used by permission).

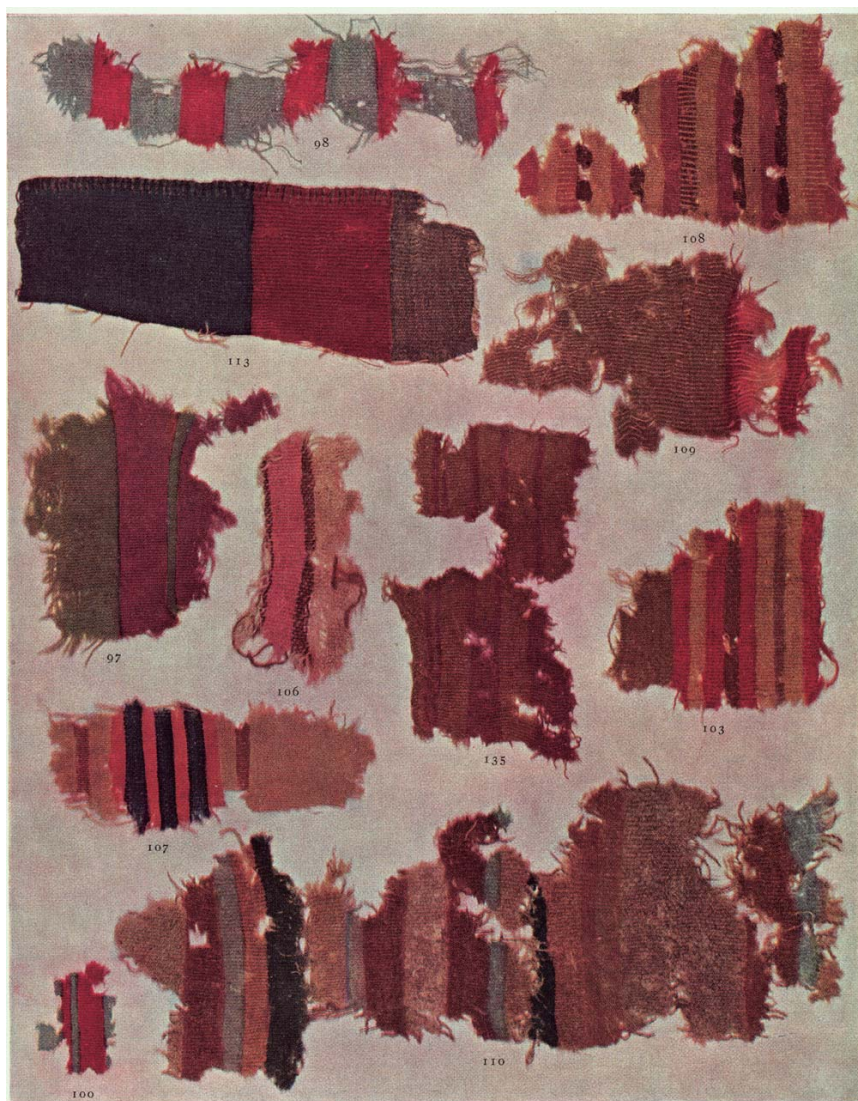


Fig. 5.8: Fragments of plain-woven wool with multi-colored weft bands. From Dura Europos, early to mid-third century (after Pfister and Bellinger 1945, pl. ii; © Yale University Press; used by permission).



Fig. 5.9: Fragment of plain-woven wool with multi-colored weft bands. From Dura Europos, early to mid-third century (©Yale University Art Gallery, Dura-Europos Collection, 1933.542a; used by permission).



Fig. 5.10: Fragment of tapestry-woven wool with weft bands of shaded colors alternating with composite ornamental bands. From Dura Europos, early to mid-third century (after Pfister and Bellinger 1945, pl. iii; © Yale University Press; used by permission).

The far-flung find sites of textiles with shaded-band designs attest to remarkably widespread markets and what we might call a syncretization of taste. (Here, I use the term syncretism to “focus attention precisely on issues of accommodation, contest, appropriation, indigenization and a host of other intercultural processes” (Stewart 1995, 28)). Indeed, these and other design families of Late Antique trade textiles seem to represent visually striking, deliberately inter-cultural, ornamental repertoires.

The spread of such luxury textiles may have occurred via various channels. Elites and government officials would have brought luxury goods with them and acquired others on their travels. The military as well as merchants served as important conduits for the dissemination of desired goods within the Roman sphere,

laying the foundation for cosmopolitan taste even in smaller towns like Karanis in Egypt's Fayum Oasis, and Dura on the eastern frontier of Syria (Bender Jørgensen 2004; Wild 2006; Thomas 2001; 2012, esp. 54, 58). Karanis, for example, which had a sizable population of military settlers from around the Roman world through at least the fifth century CE, preserves documentary texts recording the stationing of soldiers in Syria who came from Karanis. In 108 CE, one soldier stationed in or near the Syrian port city of Tyre wrote home to his mother in Karanis about the abundant shopping opportunities in Tyre to reassure her that he was in an altogether good place.² He also asked that a particular kind of linen be sent to him from Alexandria as he was unable to find it in Tyre.

One tiny fragment (16.4 × 6.4 cm) from Dura (Fig. 5.14) (YUAG 1933.502) combines alternating thin weft bands of solid colors, checks, and what appears to be a vegetal motif in an unusual design (Pfister and Bellinger 1945, 38; cat. no. 136). It seems to belong to the design family of a similar pattern depicted on a tunic in a devotional panel painting from Egypt, now in Brussels, which dates to the later second or early third century (Fig. 5.15). The two larger militant pagan divinities may be identified by their cloaks, weapons, and armor as belonging to a type of god that gained popularity during the Roman period and especially along the frontiers of the Empire (Kantorowicz 1961). The military divinity identified by Vincent Rondot (2001) as Lycurgus wears extraordinary clothing below his cloak, including the tunic with multiple decorative bands. The patterns of these bands change from one portrayal of Lycurgus (or similar soldier deity) to another: however, the constant seems to be that the tunic is patterned in multi-colored bands similar to those found among the Dura textiles (as in, e.g., a painted panel at the Wadsworth Atheneum, 1934.6; Sörries 2003, no. 15).



Fig. 5.11: Shoes with tapestry-woven wool with weft bands of shaded colors framing a central band of floral motifs. From Niya, Tomb 5 of Cemetery 1, second–third century (after Mair 2011, 198; © Xinjiang Uyghur Autonomous Region Museum Collection; by kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).



Fig. 5.12: Fragment of tapestry-woven wool with weft bands of shaded stripes and supplementary weft-wrapping. From Karanis, fourth century? (© Kelsey Museum of Archaeology / University of Michigan, 13873; used by permission).



Fig. 5.13: Sewn and knotted fragments of plain-woven wool with multi-colored weft bands of shaded stripes. From Karanis, fourth century? (© Kelsey Museum of Archaeology/University of Michigan, KM 12973; used by permission).

Garments with distinctive banded patterns like that worn by Lycurgus would have functioned iconographically much as any other clothing attribute: that is to say, as a marker of identity or character (Parani 2007), clothing the figure in exoticism that could be quite specific, as certain types of widely traded textiles came to be identified by their places of origin in a common naming practice that could be narrowed down very closely to a specific geographical location. So, for example, in Diocletian's Edict on Maximum Prices, some linens are designated as "Tarsian-Alexandrian," referring to Alexandria as the place of production and Tarsus as the place of origin of the type of cloth, whereas others are identified as "Tarsian" (Vogelsang-Eastwood 1988, 301; Carroll 1988, 8 and 12; Mossakowska-Gaubert 2000, esp. 309, 313). Unfortunately, these and other named types of textiles cannot be securely linked to artifacts now for lack of evidence and because we are much less knowledgeable about types of textiles and their origins than ancient and medieval consumers were (Golombek 1988). Just as textile types and copies of them were often specifically identified by place of origin, it is possible that the patterned cloth worn by Lycurgus may have referred visually and materially to the location of his cult origins or an important cult center: however, as neither is known for Lycurgus, any such references remain obscure. Suggestions made without consideration of his dress include far-away Thrace along the northern frontier, which may be the origin of Lycurgus's companion in the panel, the soldier-deity, Heron; Syria and Arabia, Rondot's suggestions, seem more likely (2001, 232–233; 2013). Further consideration of the

use of textile patterns in Roman and Late Antique visual culture may well enhance our understanding not only of related textile markets, but also of related religious syncretisms and other cultural amalgams made possible by expendable wealth.

Palmyra

Roman-era Palmyra, in contrast to Dura, was a caravan city, and has long been known to owe its remarkable prosperity to trade along the network of overland routes popularly known as “the Silk Road” (Browning 1979; Mathews 1984) and the sea routes that also linked Palmyra and western markets to China (e.g., Maechen-Helfen 1943, 358). During the second half of the third century, Palmyra outgrew its role as an ally of the Roman Empire, and its ruler, Odenathus, who had stopped the Persian advance after the long siege and eventual destruction of Dura Europos, emerged as a possible contender for the imperial throne of Rome. Quite possibly his assassination was inevitable: however, his widow, Zenobia, continued to rival Roman imperial power by military conquest in the East across Syria-Palestine, Osroene, and Egypt in 269 until, just a few years later, in 274, her imperial ambitions were finally checked (Fig. 5.1) (Stoneman 1995; Fowden 1999, 80). According to one account that is very evocative of the legendary fortunes of Palmyra brought under Rome’s control, after her capture Zenobia was paraded through the streets of Rome in golden chains (*Historia Augusta, Tyranni Triginta* 30, 24–26).

The riches of Palmyra (and the later Roman Empire) are reflected in the five hundred textiles found at the site that date to the first three centuries CE and are much more opulent than those of Dura. Most were found in the tombs of two prominent Palmyrene families, who like others of their status had acquired their wealth through trade as merchants, caravan financiers, government officials, and the like. The Palmyrene finds present a broad array of exotic materials (cashmere, cotton, silk, and gold, in addition to linen and sheep’s wool) and expensive dyestuffs, including the “true” purple famously harvested from the *murex* mollusk on the Syrian coast at Tyre. The several types of silks include locally produced damasks, a double-faced fabric structure with patterns in surface relief, a block twill, and Chinese warp-faced compound weaves as well as plain and patterned silk cloth imported from China, sometimes with silk embroidery added locally. One example (Fig. 5.16) provides an interesting comparison to the piece from Karanis mentioned above (Fig. 5.12) for surface decoration in the relief and color scheme of the weaving.

Textiles and dress reflect Palmyra’s diverse cultural riches as well. Scholars have long noted distinctive Palmyrene combinations of Persian and Graeco-Roman forms of dress and ornament (Goldman 1994) although few have mentioned Arab components as in the shaping of the women’s headdresses (Finlayson 2002; Stillman 2000). The Roman-style dress that predominated at Dura was less common at Palmyra (Schmidt-Colinet *et al.* 2000; Thomas 2003). Chinese inscriptions on Palmyrene textiles seem to have been appreciated, but as signs of exotic origins rather than legible language (von Falkenhausen 2000, 58–71). The wider variety of ornamental bands found at Palmyra include shaded bands in distinctive deep tones of black, crimson, and gold, alternating with bands of vegetal motifs (Figs. 5.17 and 5.18). Further evidence of Palmyrene cosmopolitan tastes shared by distant locations has been argued persuasively by Stauffer, perhaps most strikingly in her comparison of a crimson-purple and gold damask tunic and sheet (?) of a girl’s burial near Poitiers, in France, to a nearly identical find from Palmyra, proposing that textiles in the burial in France were Syrian products (Stauffer 1999–2000). Moreover, Stauffer has compiled an impressive listing of Syrians engaged in the manufacture and trade of luxurious textiles (true purple and gold) in the western European provinces of the Roman Empire (Stauffer 2007, 362). Throughout the Empire, Romans drew from the same repertory of colors, materials, motifs, designs – and exotica – to clothe themselves in distinction and glamour.



Fig. 5.14: Fragment of tapestry-woven wool with multi-colored bands of alternating designs. From Dura Europos, early to mid-third century (© Yale University Art Gallery, Dura-Europos Collection, 1933.502a; used by permission).

Antinoë and Panopolis

Antinoë and Panopolis emerge as particularly important sites for the consideration of luxury textiles in Late Antiquity. These were major cities of the wealthy province of Egypt, well situated to participate in Red Sea and Indian Ocean trade, which continued from the Roman period through a time of political uncertainty in the first half of the seventh century when Egypt was conquered first by the Sasanian Persians, then reconquered by the Byzantines, and finally taken by the Arabs to be incorporated along with Syria and Palestine into the emerging Islamicate world (Wendrich *et al.* 2003; Nappo 2009; Schörle 2010; Sidebotham 2011). During the early Roman centuries, trading ships docked at Berenike, itself a site of exotic textile finds (Wild 2006). From there some ships sailed up the Red Sea to Myos Hormos, then on to Clysma, which provided access to the Nile and the Delta via Trajan's Canal, and which gained prominence from the fourth century (Mayerson 1996). There were, in addition, well traveled and well guarded overland routes from Berenike and other ports to the Nile (Nappo 2009; Schörle 2010; Sidebotham 2011). There is written but as yet little archaeological evidence for textiles and other luxury goods traveling across Arabia along the so-called Frankincense Road or Hajj pilgrimage roads into Egypt during Late Antiquity (Reza-ur-Rahim 1972; Stillman 2000; more generally, André-Salvini *et al.* 2010). Most recent discussion has focused on the role of Mecca in pre- and early Islamic trade (Crone 1987; Heck 2003, esp. 569–571; Kennet 2005). Relatively little is known of the commercial roles of the Arab kingdoms of the Ghassanids (Byzantine allies, third to seventh centuries) and Lakhmids (Persian allies, fourth to seventh centuries), and less still of the roles of Himyar and Axum, although the region promises to be a productive area for future research (e.g., Hourani 1995, 17–49; Shahid 1995; Hatke 2013).



Fig. 5.15: Panel painting of Lycurgus, Heron, smaller servant and donor (?) figures. From Fayum, Egypt, second to early third century (© Royal Museums of Art and History, Brussels, E7409; used by permission).



Fig. 5.16: Silk damask, light brown, with mask, lozenge, and jade ring motifs overlaid by multi-colored silk embroidery. From Palmyra, attributed to China, first century (Damascus Archaeological Museum S10.1–6; © Palmyra Archive Bern; photo: A. Schmidt-Colinet; after Schmidt-Colinet and Stauffer, with al-As‘ad 2000, cat. 451, 176–177 pl. VII; used by permission).

Antinoë and Panopolis preserved significant quantities of luxury textiles that were excavated around the turn of the twentieth century, for which precise numbers and places of production are often not known (Schrenk 2006; Thomas 2007). The textiles have, however, been considered in light of long-distance trade since their discovery (e.g., Strzygowski 1903). Although until recently the textiles were dated mainly through stylistic and technical comparisons, now radiocarbon dating confirms a range of dates going up to the ninth century for textiles from the site, so they span the Roman, early Byzantine, Persian and early Islamic periods (Schrenk and Knaller 2004; Bénazath 2006; De Moor and Fluck 2006; Lintz and Coudert 2013). Throughout the long centuries of Late Antiquity, perhaps spurred by the third-century invasion by Palmyra and the seventh-century invasion by Sasanian Persians, as well as ongoing trade, several features of Persian-style dress such as fitted shapes and decorative trim around the edges of garments (Fig. 5.5) came to be incorporated into traditional, loose-fitting, Roman-style Egyptian and Syrian dress (Fluck and Vogelsang-Eastwood 2004; Pritchard 2006).



Fig. 5.17: Wool tapestry weave, multi-colored shaded bands alternated with lattice design. From Palmyra, first century (Damascus Archaeological Museum L 60; © Palmyra Archive Bern; photo: A. Schmidt-Colinet; after Schmidt-Colinet and Stauffer, with al-As'ad 2000, cat. 415, 169–170, pl. I; used by permission).



Fig. 5.18: Wool tapestry weave of multi-colored shaded weft bands alternating with bands of floral motifs and “S” motifs. From Palmyra, first century (Palmyra Archaeological Museum K 3; © Palmyra Archive Bern; photo: A. Schmidt-Colinet; after Schmidt-Colinet and Stauffer, with al-As'ad 2000, cat. 179, 132–133, pl. I; used by permission).

In recent years, as scholars have researched the history of the excavations, findspots of the textiles and the assemblages of artifacts with which they were found, and the history of their treatment (Martiniani-Reber 1986; Calament 1989; Rassart-DeBergh 1997; Del Francia Barocas 1998; Schrenk 2006; Lintz and Coudert 2013), scholarly attention has turned to textiles from Antinoë that were recovered during the explorations of Albert Gayet. Of the textiles attesting an appreciation of exotic luxuries, one brightly colored shaded band in a recently analyzed burial assemblage extends the chronological span of the use of such bands by several centuries into the seventh century (Lintz and Coudert 2013, 251, no. 73), long past their main period of use in the first to third centuries (Granger-Taylor 1987, 22–23). No Chinese silks were found at Antinoë, however, of the compound-woven silk and wool textiles that have been attributed to Persia, many present motifs repeating in rows that regularly alternate their spacing to create a lattice grid. Numerous variations on this design may

include majestic birds, fierce animals, human faces (masks?), crosses, jewels, and chalices brimming with fruit or plants. One wool taqueté, a plain compound weave (Fig. 5.19), presents a simple version of such designs: in this version, white circles against blue and red grounds may be read as a roughly hexagonal lattice grid from the front, with the colors reversed on the back (Martiniani-Reber 1997, 128–129). Also found at Antinoë are the better known silk twill compound weaves, known as samite, some with ground and motifs in two contrasting colors, and others with multiple colors disposed in alternating registers (Schrenk 2006, 26). Diaper designs, with motifs in registers of alternating colors (Fig. 5.20) similar to the floral pattern at Dura (Fig. 5.3), are characteristic of many of the silks and other textiles excavated at Antinoë (Martiniani-Reber 1997, 86–87). This is of particular interest in regard to earlier designs of colored bands because what is suggestive of aesthetic links to later designs is the alternation of colors and motifs that play with the prioritization of foreground, background, and fields of vision. Even in the simplest compositions this has an animating effect: hence, my reconstruction images of the faded and damaged textile artifacts (Figs 5.19 and 5.20). Textile color patterning was indeed sometimes refreshed by paint in antiquity (Martiniani-Reber 1997, 63).

Textiles excavated at the cemeteries surrounding the city of Panopolis by Robert Forrer include compound-woven twills in silk, some, like the lattice designs from Antinoë, ornamented with vegetal and animal motifs, faces, bust-length and other figural motifs (Fig. 5.21) (Forrer 1891; Fluck 2008; O’Connell 2008; Thomas 2012). Pieces cut and shaped as *segmenta*, in long and short bands, squares, and roundels were applied to tunics. (To my knowledge there has been no study of how often these were found in instances of original use or reuse.) These apparently local Egyptian products may have been made from silk thread imported from Syria (where sericulture had been introduced in the sixth century) or from farther away. Similar designs seem to have been produced in Syria as well (e.g., a roughly contemporaneous figural medallion excavated at the site of Halabiyeh: Pfister 1951, 40–42, pl. xviii [Hal. 104a=99], and pls. xxvii–viii).



Fig. 5.19: Reconstruction drawing based on wool taqueté design of circles inside hexagons in an overall lattice pattern. From Antinoë, attributed to Sasanian-era Persia (drawing: the author, based on Louvre inv. AF 5666; after Martiniani-Reber 1997, cat. 75, 128–129).

Of special interest for considerations of commerce in the syncretization of taste are Panopolitan

compound twills of the sixth–ninth centuries with designs of medallions that contain a fantastical kind of plant incorporating several varieties of stems, leaves, and fruits (De Moor *et al.* 2006; Thomas 2012); these medallions have also been found on larger sheets of silk, unfortunately without archaeological documentation (Fig. 5.22). Once dubbed “the medallion style” by James Trilling, related designs of repeating roundels were produced throughout the long Late Antiquity (and after) in numerous thematic variants all along the trade routes from China to the Mediterranean in silk artifacts and in depictions of silk clothing (Trilling 1985; Ierusalimskaya and Borkopp 1996; Juliano and Lerner 2001). Indeed, both the lattice and medallion design families, much like earlier shaded-band ornamentation, appealed to cosmopolitan tastes across the known world, in effect locating the wearer socially and cosmically.

Exotic textiles and their designs: speculations on commerce and cosmos

Among the later silks from Antinoë and Panopolis are examples of two of the most common designs for compound-woven silk in the Eastern provinces from the fifth century (if not earlier). Overall repeating patterns of diamonds and medallions, also widely represented in visual arts, were chosen to decorate the silk cloaks of a pair of soldier saints in a Christian icon preserved in the Monastery of Saint Catherine on Mount Sinai in Egypt, which may be dated perhaps as early as the mid-sixth century (Fig. 5.23). The panel painting represents various types of sacrality in the creative hand of God descending from the firmament and spreading divine light, in the brilliant white of the angels below, the Christ child resplendent in gold clothing and Mary in majestic purplish-blue, as well as in the bright silk cloaks of the flanking saints. Care was taken to depict the characteristic luster and color schemes of the soldiers’ silk cloaks (Fig. 5.24) and such characteristics of compound weaves as reversibility and the inversion of color scheme from front to back (Figs. 5.25–5.26). It is well known that in late Rome and early Byzantium, silk was rare and expensive enough that it was associated with elites, and certain types were legally the prerogative of the emperor and his court, such that, in modern art historical scholarship (which rarely addresses the archaeological evidence from Egypt), Byzantine silk is routinely associated with the imperial court at the capital city of Constantinople (Maguire 1997; Thomas 2012). Other associations may be significant as well.



Fig. 5.20: Reconstruction drawing based on silk samite with palmettes and crenellations in a staggered arrangement in weft-bands of alternating colors. From Antinoë, Tomb 148, necropolis B, attributed to Sasanian-era Persia (drawing: the author, based on Louvre inv. E 29367; after Martiniani-Reber 1997, cat. 35, 86–87).



Fig. 5.21: Color reconstructions, mainly of silk compound weaves with various motifs arranged in overall repeating lattice patterns. From Panopolis, fourth–eighth/ninth centuries (after Forrer 1891).



Fig. 5.22: Silk compound-woven twill (samite) with fantastical plant motifs in medallions and in the interstices between medallions. Find spot unknown, sixth–ninth centuries (© Dumbarton Oaks, Byzantine Collection, Washington, DC, BZ.1977.2; used by permission).

The Christian icon was originally framed like the earlier pagan panel (Fig. 5.15). Based in part on such technical, textual and archaeological evidence from Egypt, Thomas Mathews has argued persuasively for a continuous tradition of painted panels in private devotional use (Mathews 2006; 2011; see also Sörries 2003; Rondot 2013). There is early evidence for this tradition in Syria at Dura as well (e.g., YUAG 1929.288; Brody and Hoffman, 2011, 322 and pl. 2; Rondot 2013). In both the earlier and later panels only the military figures are dressed in up-to-date versions of exotic fabrics. Such cloth characterizes the soldier saints as contemporary from an earthly, commercial perspective. In light of venerable habits of viewing in which the Roman elite cast themselves in the form of gods (and in the clothing or heroic nudity of gods) in daily life and in funerary imagery (Wrede 1981; Thomas 2000; Zanker and Ewald 2004), this would seem to be a deliberate reversal of that strategy, dressing divine or holy figures in the form of “people nowadays.” In another sense, such cloth might be seen in conjunction with other items of long-distance trade or great material value, such as in the Christian icon, the pearls and gold on the Virgin’s throne, materials that in early Christian religious discourse attained extra-material, spiritual value (Thomas 2012). Silk also acquired spiritual value, and seems to have assumed a mediatory role in its uses for wrapping sacred books and relics (see Fig. 5.32) (Fulgham 2002; Thomas 2012); in this sense, the icon presents a scene in the court of heaven in which silk envelopes the resurrection bodies of holy saints who mediate between God and humankind.

Further conceptual mirroring of links between spiritual significance and valuable earthly material specifically within the context of commerce is evident in the sixth-century text now known as *The Christian Topography* by the merchant-turned-cosmographer known as Cosmas Indicopleustes (Wolska-Conus 1962; 1990). Written and apparently illustrated in Alexandria during the sixth century, the treatise demonstrated in five chapters the folly of pagan conceptions of a spherical universe based in myth and science against a Christian scriptural view of the cosmos. In text and diagrams Cosmas presented the earth as a cubical chamber below the vault of heaven: this form had been revealed to Moses as a pattern of the world, then re-envisioned in the tabernacle built according to the divinely revealed specifications, in which the earth is a type of altar offering the fruits of the earth and the vault of heaven is symbolized by colored veils covering the tabernacle and separating the inner from the outer sanctuary (Brubaker 1977; Clark 2008, 25).

As the treatise was not well received in all circles, Cosmas later added chapters to refute critics of the first edition and a chapter citing his research into ancient pagan antecedents to Christian Old Testament accounts: this example gives us a sense of just how fluid these ideas, debates, and discourses were, and how deliberately interwoven. In the eleventh chapter based in the author’s extensive travels as a merchant and his knowledge of

the places of origin of goods, Cosmas located the origins of silk in China at the edge of the world. Beyond the land of silk, “there is neither navigation nor any land to inhabit” (Cosmas Indicopleustes, *The Christian Topography* II, 13). Beyond was Ocean, and beyond Ocean to the east lay Paradise, and beyond Paradise, the entrance to heaven where the righteous deceased are consigned until the Second Coming of Christ. In this view, the glamour of silk associated with its characteristic luster, intense coloration, difficulty of access, technological advances in weaving, expense, and rarity was incalculably enhanced by the proximity of its place of origin to Paradise.



Fig. 5.23: Panel painting of Virgin and Christ child enthroned, flanked by soldier saints and angels, below the hand of God. Sixth or seventh century (The Holy Monastery of Saint Catherine, Mount Sinai; photo: the author, by kind permission of Father Justin).

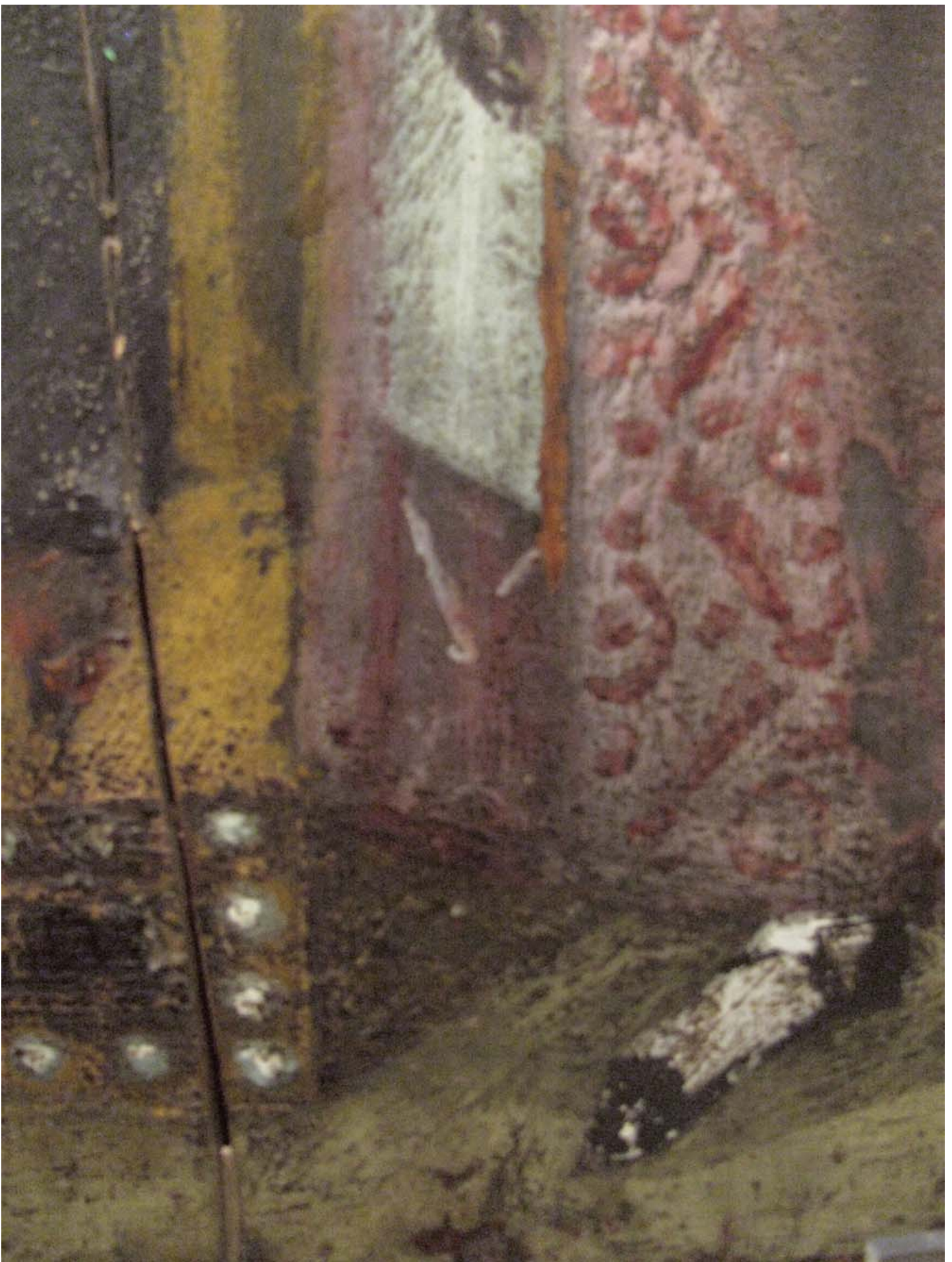


Fig. 5.24: Detail of painted silk cloak worn by saint at right in Fig. 5.23 (The Holy Monastery of Saint Catherine, Mount Sinai; photo: the author, by kind permission of Father Justin).



Fig. 5.25: Silk textile fragment. Compound-woven twill (samite) with lattice vine framing birds in medallions. Find spot unknown. (Photo: "Textile Fragment. Front. 6th–7th CE. Attributed to: Iraq or Syria. Silk. Charles Stewart Smith Memorial Fund, 1915 (15.109). The Metropolitan Museum of Art, New York, NY, U.S.A." . Image copyright © The Metropolitan Museum of Art. Image source: Art Resource, NY).



Fig. 5.26: Reverse of silk textile fragment in Fig. 5.25. (Photo: "Textile Fragment. Reverse. 6th–7th CE. Attributed to: Iraq or Syria. Silk. Charles Stewart Smith Memorial Fund, 1915 (15.109). The Metropolitan Museum of Art, New York, NY, U.S.A." Image copyright © The Metropolitan Museum of Art. Image source: Art Resource, NY).

In locating Paradise in the east beyond Syria and Arabia, beyond the far-off lands of Persia, India, and China, and beyond human access across Ocean, Cosmas drew upon an ancient tradition that had come to be widespread in Early Christian thought (Mayerson 1993; Podskalsky *et al.* 1999; Parker 2002). Although Cosmas himself visualized this idea in a diagrammatic map along with other explanatory images, the text and images of Cosmas' book now survive only in later Byzantine-period copies of the ninth and eleventh centuries, themselves luxury productions with lavish illustrations painted on vellum (Brubaker 1977; Clark 2008, 10, n. 1). As depicted in an eleventh-century copy of *The Christian Topography* at the Monastery of Saint Catherine at Mount Sinai, Paradise is a lush garden of plants and trees so fertile that they bear blossoms and fruit simultaneously and is the source of the four rivers that run below Ocean and then appear again in the inhabited part of the world as the rivers Phison (Ganges), Tigris, Euphrates, and Nile (Weitzmann and Galavaris 1973, 52–65). These waterways, it should be noted, re-distribute Earth's bounty, God's blessings, through commerce.

Conception and images rely upon ancient, pre-Christian cosmographies that resonate with citations in the final chapter for pagan antecedents for Cosmas' Christian, scriptural worldview (Maguire 1987a, 7, 23, 26, and 37; 1999a).

Although scholars have paid little attention to the eleventh book of *The Christian Topography* of Cosmas Indicopleustes, its imagery as presented in the Sinai manuscript may be seen to operate in a visual language by which distinct places are represented by their distinctive trade goods, including, along with silk, plants, fruits, and animals, such things as musk from the musk-deer of India (Fig. 5.27) and pepper from the pepper trees of Mali (Fig. 5.28). This imagery presents an essential aspect of Cosmas' worldview, which was permeated by commerce. Goods, according to Cosmas, were also God's blessings, and there must have been merchants to bring the necessary supplies to the Israelites as Moses led them through the desert (V, 205).

Cosmas mentions many of the same places and products as the author of *The Periplus Maris Erythraei*, a first-century sailing itinerary for the Red Sea, characterizing foreign lands as the places where characteristic luxury commodities and goods originated. As Grant Parker noted, "The underlying thought, we might say, is that an object is known by knowing its origin, whether topographical or personal" (2002, 86). The images in the Sinai manuscript of *The Christian Topography* include initial acts of acquisition, such as the hunting of the musk-deer and the harvesting of pepper (Figs. 5.27–5.28), and the harvesting of coconuts (Fig. 5.29) that preceded trade in these aromatics, spices, and exotica. Silk, one of the most frequently mentioned exotic goods in Cosmas' text, traveled along the same routes.

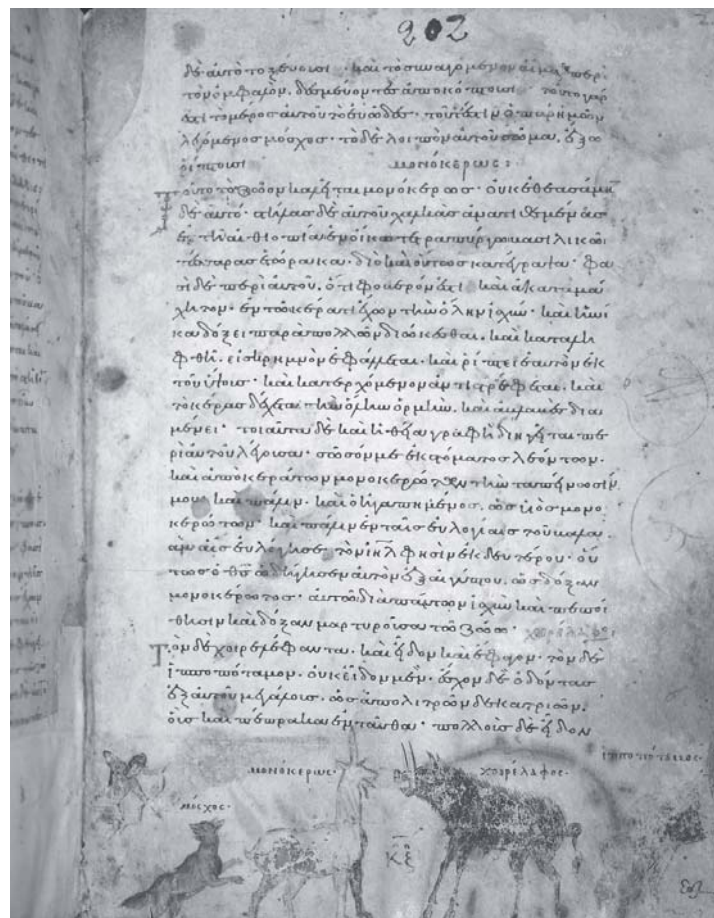


Fig. 5.27: Page with miniature paintings, with an armed man preparing to shoot an arrow at a musk-ox, other exotic animals, folio 202r, in *The Christian Topography* of Cosmas Indicopleustes. Place of origin unknown, early eleventh-century copy of sixth-century manuscript (The Holy Monastery of Saint Catherine, Mount Sinai, Inv. No. Codex 1186; photo: ©The Holy Monastery of Saint Catherine, by kind permission of Father Justin).

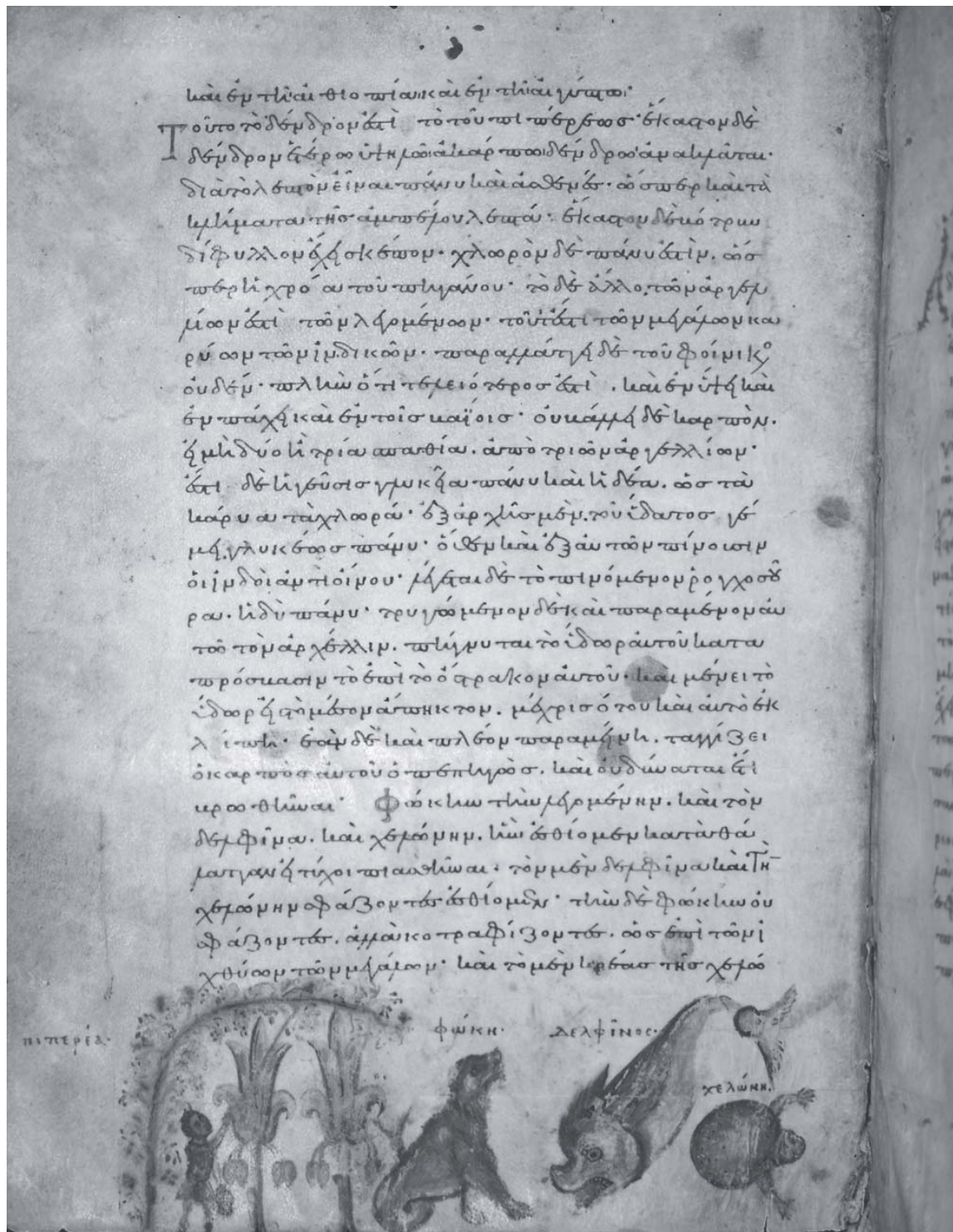


Fig. 5.28: Page with miniature paintings of exotic plants and sea creatures, folio 202v, in The Christian Topography of Cosmas Indicopleustes. Place of origin unknown, early eleventh-century copy of sixth-century manuscript (The Holy Monastery of Saint Catherine, Mount Sinai, Inv. No. Codex 1186; photo: ©The Holy Monastery of Saint Catherine, by kind permission of Father Justin).

conceptual depictions of the world (Figs. 5.30–5.31). These seem to have been particularly popular in the eastern Roman provinces of Greece, Palestine, and Syria, where they developed traditional Graeco-Roman compositions, some of which, as scholars have long pointed out, are also related to textiles, especially silks (Maguire 1987b, esp. 228; Dunbabin 1999; 2006, 327–329 and *passim*; Gonosová 1987; Hachlili 2009, 179–182). Indeed, a tradition of representing the bountiful earth in woven textiles seems to have continued from the Roman period, as attested in a Greek epigram by the first-century poet, Philippus of Thessalonica, and by numerous tapestry-woven textiles found in Egypt, throughout the long Late Antiquity into the Fatimid period – again by a textual attestation (Paton 1917, 418–419, no. 778; Bloom 1985, 31 and 33; Maguire 1987b, 221; and Bierman 1998, 12).

In the Late Antique mosaics, compositions representing the bounty of Earth may be organized within a lattice pattern, as at the sixth-century pavement at the Khalde basilica in present-day Lebanon (Fig. 5.30). In most of the diamond-shaped cells of this design, animals and plants represent Earth's bounty, the lattice framing each item in a separate space as if in a distinct place. In two adjacent diamonds along the edge of the mosaic are ships suggesting travel between places. As the art historian Henry Maguire has shown, ships of a special kind sail Ocean and the rivers of Paradise to ferry the blessed soul's transition from this world to the next in both ancient pagan and Christian Graeco-Roman traditions (Maguire 1987a, 34). In a lattice cell near the boats, a beast of burden transports not weightless souls, but the weighty material things of actual commerce. A basket full of fruit in another cell suggests both the collection of Earth's bounty and the generative nature of Ocean. The lattice, an ordering grid composed of flower blossoms, seems to conflate the rivers of Paradise and Earth with their bounty and all the animals of God's creation, thereby offering an allusive and symbolic alternative to diagrammatic or more straightforward symbolic representations of Earth and Ocean like those in the Cosmas manuscripts. Although studies of Greek, Roman, and Late Antique ornament rarely attribute meaning to design structure, in this reading the message and the conceptual relationship between the lattice grid and the motifs inside are incomplete if either grid or interior cells are ignored.

In other instances, the organizing lattice framework may be irregular and organic, leafy and lush, as in a late sixth-century mosaic pavement of the Church of the Priest John near Mount Nebo (Fig. 5.31), in which a personification of Earth carrying her fruits in a cloth held in front of her chest holds the center of the composition. Below Earth is the figure of a youthful hunter who will acquire bounty with his slingshot; another hunting youth may have been represented above and, to either side, youths approach Earth to present baskets of fruit. (Interestingly, part of the meander frame around this composition is composed of shaded bands of colors.) Conceptually, this bounty of earth, air, and ocean, symbolizing God's gifts and blessings over all the world, was presented as well to those who were assembled in the church. Henry Maguire has clarified how such mosaic pavements locate the church congregation within cosmic space (Maguire 1999b; for seasonal and astral associations, see Tomašević 1967 and Kolarik 2012). These compositions, however, were “multivalent, ambivalent, and ambiguous” (Maguire 1987a, 10) in reference to spiritual and ecclesiastical economies (Caner 2006): these compositions echo similarly themed Late Antique textile hangings from domestic settings, which Maguire and Laszlo Török have shown to auspiciously characterize the providence of elite householders and their homes (Maguire 1999a; Török 2005, 231; Fluck 2012, 167, n. 1). Similarly, Ellen Swift has considered how Roman domestic mosaics, display silver, and items of personal adornment all worked together so that a person adorned by his or her possessions was also socially constituted by them (Swift 2010; Thomas 2012, 132–133). Notably, the lattice pattern also carries connotations both of a physical barrier and of transparency, that is, visual access: one sees through the compositional grid to what lies within and behind it (Branham 1992, 75; Paton 1917, 420–421, no. 781); as a result, the motifs have a characterizing function

One final composition may help illuminate the network of associations linking exoticism of material and technique, motif and design to prosperity and luxury, cosmos and commerce in Late Antique conceptual world

construction. The very fragmentary ninth-century compound-woven Byzantine silk (with Greek inscriptions) used to wrap the relics of St. Cuthbert at Durham Cathedral in Britain employs similar referential strategies to express what were, by the ninth century, venerable associations between the Wonders of Creation, the bounty of Earth, *and* silk cloth, a man-made wonder and traded luxury good (Granger-Taylor 1994, 126–128; 1998). This piece has suffered such ruinous damage that only in a reconstruction drawing (Fig. 5.32) is the repeating design discernible: a roundel containing a personification of Earth similar to the mosaic pavement in the basilica at Mount Nebo. Earth rises from the multicolored waves of Ocean. Too little remains to reconstruct the head of the figure, but we can see that Earth carried in each hand something like a Dionysiac *thyrsus*. The motif represented within the lattice grid of her Persian-style garment is found as well on contemporaneous textiles, including compound-woven silks (Fig. 5.33). Thus, this composition combines the two most common designs for compound-woven silks in, first, the lattice pattern of Earth's fictive silk garment and, second, in the medallion grid of the actual cloth, which also organizes colorful motifs of abundance within and between medallions in the precise repetition characteristic of compound weaving. Within each medallion, the silk-clad and bejeweled figure of Earth articulates associations between natural bounty and man-made luxury, between the creation of the world and its ordering (*ktisis*), and adornment (*kosmesis*) (e.g., Maguire 1987a, 48–49). Conceptions of order and constitutive adornment may be evident as well in the Christian painted panel in the different kinds of cloth articulating the different natures of the saints, angels, Christ, and Mary, and thus their places within the heavenly hierarchy (Thomas 2012, e.g., 64–65).



Fig. 5.30: Detail of a mosaic pavement with motifs of bounty, placed into a lattice-work frame of floral motifs. Basilica church at Khalde, Lebanon, sixth century (from Chehab 1959).

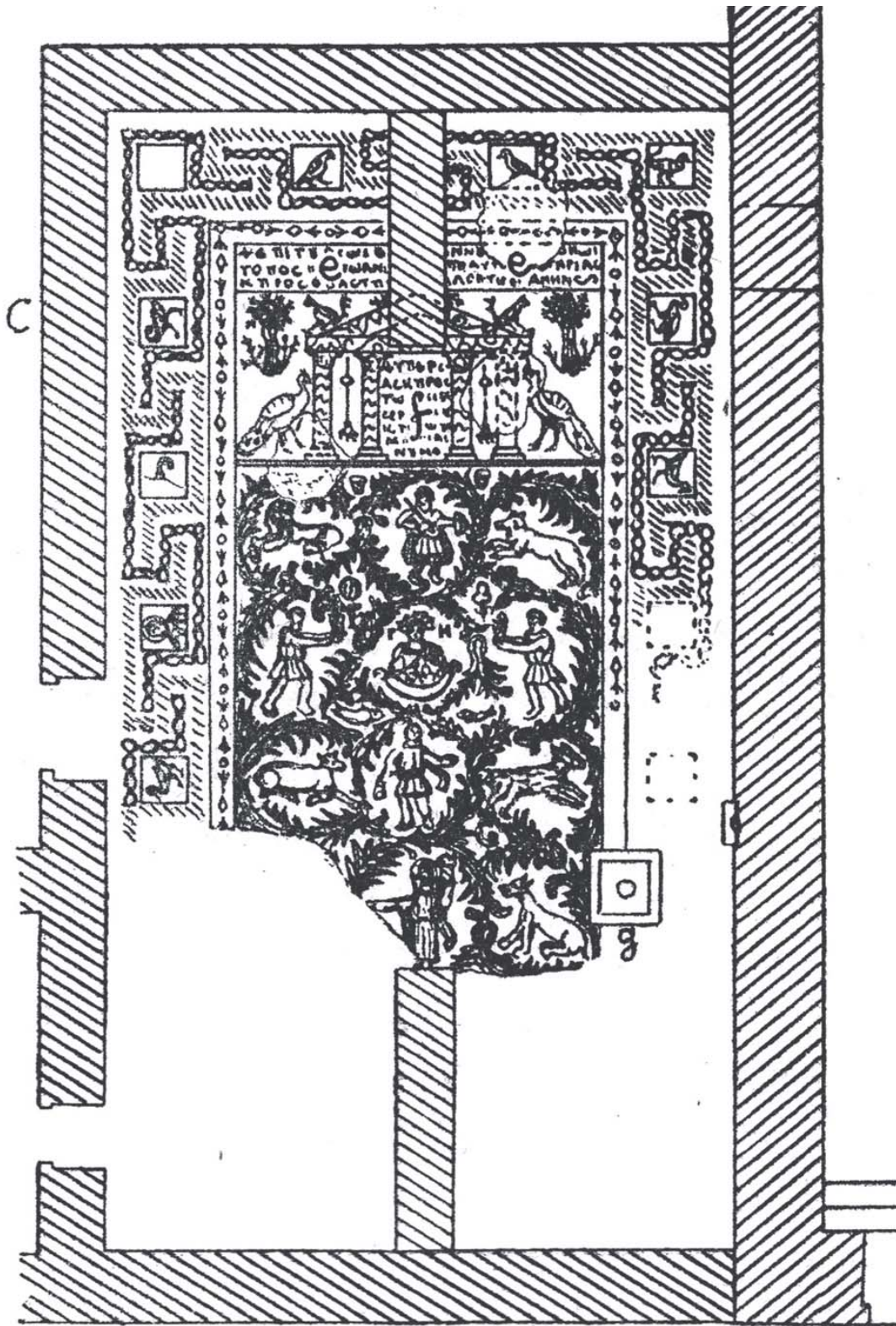


Fig. 5.31: Drawing of mosaic pavement with motifs of bounty with leafy, irregular framing. Church of the Priest John, Mount Nebo, Jordan, sixth century (after Saller 1941).



Fig. 5.32: Reconstruction drawing of silk compound-woven twill (samite) with the repeated motif of Earth, wearing a lattice-patterned garment, in a medallion framed with various fruits, and in the interstices fruit- and plant-filled chalices flanked by birds. Ninth century? Found in the tomb of Saint Cuthbert, Durham Cathedral. From Constantinople? (reconstruction drawing by the author, after Granger-Taylor 1994, cat.no. 139, 126, fig. 139 (design)).



Fig. 5.33: Silk textile fragment. Compound-woven twill (samite) with motif of fruit (?) on a pedestal in an overall repeating lattice design. (Photo: "Textile fragment. 7th–8th CE. Islamic. Silk. Fletcher Fund, 1946 (46.156.13). The Metropolitan Museum of Art, New York, NY, U.S.A." Image copyright: © The Metropolitan Museum of Art. Image source: Art Resource NY).

The clothing of the soldiers in both devotional panels may be seen to resonate with trade in luxury textiles and contemporaneous economic thought. In some strands of contemporary Christian theology, the continual redistribution of surplus wealth in charitable acts was seen as essential to just behavior and the economy of salvation, developing an ancient economic theory that held commerce to be a divinely established link between people, places, and their goods (Karayiannis and Drakopoulou Dodd 1998). This is similar, I suggest, to images that allude to waterways originating in Paradise bringing blessings and bounty to the inhabited world (Maguire 1987a, 26 and 37). According to Cosmas, this redistribution, too, was divinely ordained, as on the third day of creation, God:

Ücollected the water into one mass and exposed to view the dry land, which he called earth and which was before hidden by the waters; and he made the seas, that is, the ocean Ü and also made the four gulfs

which run up into this earth of ours Ü [By the four gulfs, Cosmas means the Mediterranean Sea, the Arabian Gulf, the Persian Gulf, and the Caspian Sea.] He also so prepared the gulfs that they could be navigated and afford a means of transit to different parts of the world, thus always uniting the dispersed nations in the bonds of amity through the facility with which commodities might be transported from nation to nation. And he commanded all kinds of fruits and trees and green herbs to spring up out of the earth. (Cosmas Indicopleustes, *The Christian Topography* III, 166)

Cosmas presents an unusual perspective, to be sure, but it was founded in current Christian discourse and economic theory and reflected in traditional textile and mosaic compositions. Might this perspective be related as well to contemporaneous pagan universalist discourses celebrating the coexistence of the many different gods associated with all the places of the inhabited world, especially those of pagan monotheistic views (Nilsson 1963; Athanassiadi and Frede 1999)?

From both perspectives, Lycurgus's garment with its distinctive pattern of bands, in contrast to the traditional Roman armor, cloak and tunic of his companion, would seem to place Lycurgus east of the Roman Mediterranean sphere, perhaps generically, if the design did not allude to a particular place, or, perhaps specifically, if intended to be recognizable to connoisseurs of the various origins of trade textiles. The soldier saints in the Sinai icon cannot be securely identified, and so the relation of their cult sites to their manner of dress is unknown. It may be enough to identify their dress as of the military elite or associate their status so closely to the contemporary imperial court that their cosmopolitanism is particularly Constantinopolitan, yet artifacts and depictions of exotic cloths offer complementary perspectives onto a wider world of luxury in later Antiquity. The silk of the Christian soldier saints' cloaks associates them not only with Persia and China, places beyond the eastern frontiers of the Empire, but also east of this earth, much as Cosmas's outlook on trade in exotics turned farther east toward a distant horizon tinged with fantastic prosperity, where trade nearly met Paradise.

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Notes

- 1 Images of the brocade fragments, YUAG 1933.521 A and B, are available through the YUAG online database; Pfister and Bellinger 1945, 53–54, cat. no. 264.
- 2 University of Michigan papyri: P. Mich. inv. 5888; APIS record: Michigan.apis.2580, accessed 4/7/12.

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Decoration, astrology and empire: inscribed silk from Niya in the Taklamakan Desert

Lillian Lan-ying Tseng

In 1995 a piece of silk fabric measuring 18.5 cm in length and 12.5 cm in width was discovered in Tomb 8 (95MNIM8) at Niya, approximately 100 km north of present-day Minfeng, Xinjiang (Figs. 6.1; 7.1 (map)). Though small in size, the silk fragment has attracted both academic and non-academic attention in China because of its inscription, which reads, “The conjunction of the five planets in the East would benefit the Middle Kingdom.”¹ The public viewed the discovery as a good omen for the People’s Republic of China, whose national flag happens to feature five stars (Xu 2011). Scholars, on the other hand, believed that the inscription referred to a historical event, but debated which one (Zhong 1999:2, 121; Qian 2002).

This paper acknowledges the significance of the inscription woven into the silk but calls for a different approach. I connect the inscription to the formation of the Han Empire (207 BCE–220 CE) and argue that celestial prognostication was invented to cope with a new polity that was distinguished by rapid territorial expansion. I also analyze the design of the textile itself, whose text and image, like the decoration of contemporary lacquerware and bronze mirrors, reflect the auspicious mentality. Finally, I examine Niya’s cross-cultural location and discuss what the inscription may have signified to those who produced the silk in the heartland and to those who used the silk on the edge of the Taklamakan Desert.



Fig. 6.1: Inscribed silk (detail of Fig. 6.14). 18.5 × 12.5 cm. Unearthed in 1995 at Niya, Xinjiang (photo: Zhao and Yu (eds.) 2000, fig. 24f.; copyright and courtesy of Zhao Feng).

Sky and territory

According to Sima Qian (c. 145–86 BCE), a historian in charge of both celestial and human affairs at the Han court, “If the five planets happen to pile up in the East, China has the advantage of commanding troops; should they amass in the West, however, the advantage belongs to the foreign country” (Sima 1992, 1328). It is apparent that the position of the five planets was regarded as an important omen for international military actions by the first century BCE.

Celestial prognostication was invented to accommodate the swift growth of the Han Empire, whose territory eventually reached the Korean Peninsula in the east, present-day Vietnam in the south, and the Pamir Plateau in the west. As Ban Gu (32–92 CE), another historian at the Han court, pointed out, “The First Emperor of the Qin defeated [nomads like] Rong and Di. [He] built the Long Wall to demarcate the Middle Kingdom. However, the western extent [of the Long Wall] did not go beyond Lintao” (Ban Gu 1990, 96a.3872). In other words, the Han was the first Chinese dynasty to claim the Hexi Corridor, between the Gobi Desert and the Tibetan Plateau, and to control the area around the Taklamakan Desert. The Han people were proud of the unprecedented expansion of their territory, but they also felt that their “world system” was greatly challenged.

The world system was shaped in the chaotic Warring States period (475–222 BCE) before the First Emperor of the Qin unified China in the third century BCE. It emphasized the correlation of the sky and the states. In the West, the Greeks, drawing on Mesopotamian astronomy, marked the path of the sun in the sky with the zodiac, choosing 12 arcs of 30° along the ecliptic and naming each section for the constellation that it contained. In the East, the Chinese, like the Arabs and the Indians, marked the path of the moon in the sky, dividing the equatorial circle into 28 unequal segments, each containing a constellation. When the ancient

Chinese came to believe that human affairs and celestial signs were correlated, they allocated each state its corresponding constellations. After the unification of China, the Han people made the 13 states into 13 administrative regions (*zhou*) (Pankenier 1999; Tseng 2007, 193–194; 2011, 310–311). Since each of the 28 constellations was already matched to one or another of the 13 regions in the heartland, geopolitical expansion presented a problem: how to correlate the territory along the Hexi Corridor and around the Taklamakan Desert to their plan of the sky.

The solution of the Han people was to divide the sky into two parts, the East and the West, and to associate celestial signs in the Eastern sky with the well-being of the Han Empire and those in the Western sky with the well-being of their enemies along the border. That gave them two parallel world systems: when they dealt with the heartland, they used the old allocation system, and when they tackled border affairs, they employed the new dual system. The juxtaposition of the two systems, rather than the integration of the new territory into the preexisting system, reveals how reluctant the Han people were to give up their Middle Kingdom mentality and how persistent they were in distinguishing the center from the periphery (Pankenier 2000, 7–10; Tseng 2007, 189–198). The prognostication that the conjunction of the five planets in the East would benefit the Middle Kingdom derived from the efforts they made to modify their worldview to cope with their empire building.

Although Sima Qian introduced the prognostication involving the five planets, he did not provide any examples of its application. It is from Ban Gu's account of a historical event that we have a glimpse of how the prognostication might have been employed. The event was the Han general Zhao Chongguo's (137–52 BCE) conquest of the Qiang people in 61 BCE. When General Zhao led an expeditionary force to Jincheng (west of present-day Lanzhou; see general map), the seasoned general regarded governmental prestige as the key to long-lasting peace with the Qiang people. Influenced by the officials who favored a more aggressive policy, the Emperor sent Zhao an edict, commanding him to launch a quick attack against the Qiang. It is in this edict that the conjunction of the five planets is mentioned:

Now the five planets emerge in the East; the Middle Kingdom will enjoy great advantages, while the barbarians will suffer a crushing defeat. Venus rises high, which is auspicious for those who dare war but an ill omen for those who do not ever dare. (Ban 1990, 2981)

On the day *wushen* of the sixth month (August 20), Zhao replied to the exhortation, giving a different perspective and explaining the reason why he was unwilling to wage the war before exhausting all diplomatic measures. On the day *jiayin* of the seventh month (August 26), Zhao received another edict that approved his approach (Ban 1990, 2981–2983). Since it took only six days for Zhao and the Emperor to exchange messages between Jincheng and the capital, the first edict to encourage the war could have been composed around August 17. Based on modern astronomical reconstruction through the software *Starry Night*, the five planets did indeed converge in the East around 6:18 a.m. on August 27, about ten days after the first edict was issued (Fig. 6.2), which indicates that the Emperor's edict was based on court astrologers' calculations, not observation, and on prediction, not hindsight. The planetary convergence lasted only three days, during which the sun rose with Mercury and Jupiter. The conjunction of all five planets was thus barely discernible to the naked eye (Tseng 2007, 186–187). David Pankenier proposes a different reconstruction and concludes that the first edict involving the five planets and Venus "... could only have been made after about mid-November" (Pankenier 2000, 10–15). His inference does not agree with the dates of the event specified in the Han official records.

The text woven into the silk was possibly longer. Archaeologists retrieved another fragment from the same tomb: this fragment had the inscription "Quell the southern Qiang" (Fig. 6.3). They suggest that the two pieces could have been cut from the same bolt of silk because both have identical features. First, both are the same kind of fabric: warp-faced compound tabbies, with two sets of warp threads forming the face and the

back and two sets of binding weft threads in between. A warp-faced compound tabby, called *jin*, was a trademark of ancient Chinese weavers, in contrast to a weft-faced compound tabby produced by their contemporaries to the West, from Central Asia to Europe (see also Figs. 8.1 and 8.2). Second, both pieces display five colors, with dark blue for the ground and with off-white, crimson, green, and yellow in combination for the pattern. And third, both pieces have the same density, the warp count being 220 threads per cm and the weft count, 24 threads per cm (Zhong 1999:2, 119). Zhao Feng, a textile expert, has attempted to reconstruct the original silk by putting both pieces together (Fig. 6.4) (Zhao and Yu 2000, 25). However, it is also possible that both pieces could have been made from the same configuration of warps but woven with different designs at different times.

The term “southern Qiang” from the second fragment first appeared in Ban Gu’s historical accounts in explaining why Emperor Wu (reign 141–87 BCE) intended to seize the Hexi Corridor: he wanted to sever the tie between the Xiongnu in the north and the Qiang in the south (Ban 1990, 1644–1645 and 3928). The Qiang people lived mainly along the border of present-day Gansu and Qinghai provinces, in the basins of the Huang and Yellow Rivers, although various groups occupied northern Sichuan as well as southern Xinjiang; some even migrated to Ningxia, Shaanxi, and Shanxi (Ma 1984, 90–111). Geographically speaking, they all lived south of the area where the Xiongnu people were active.

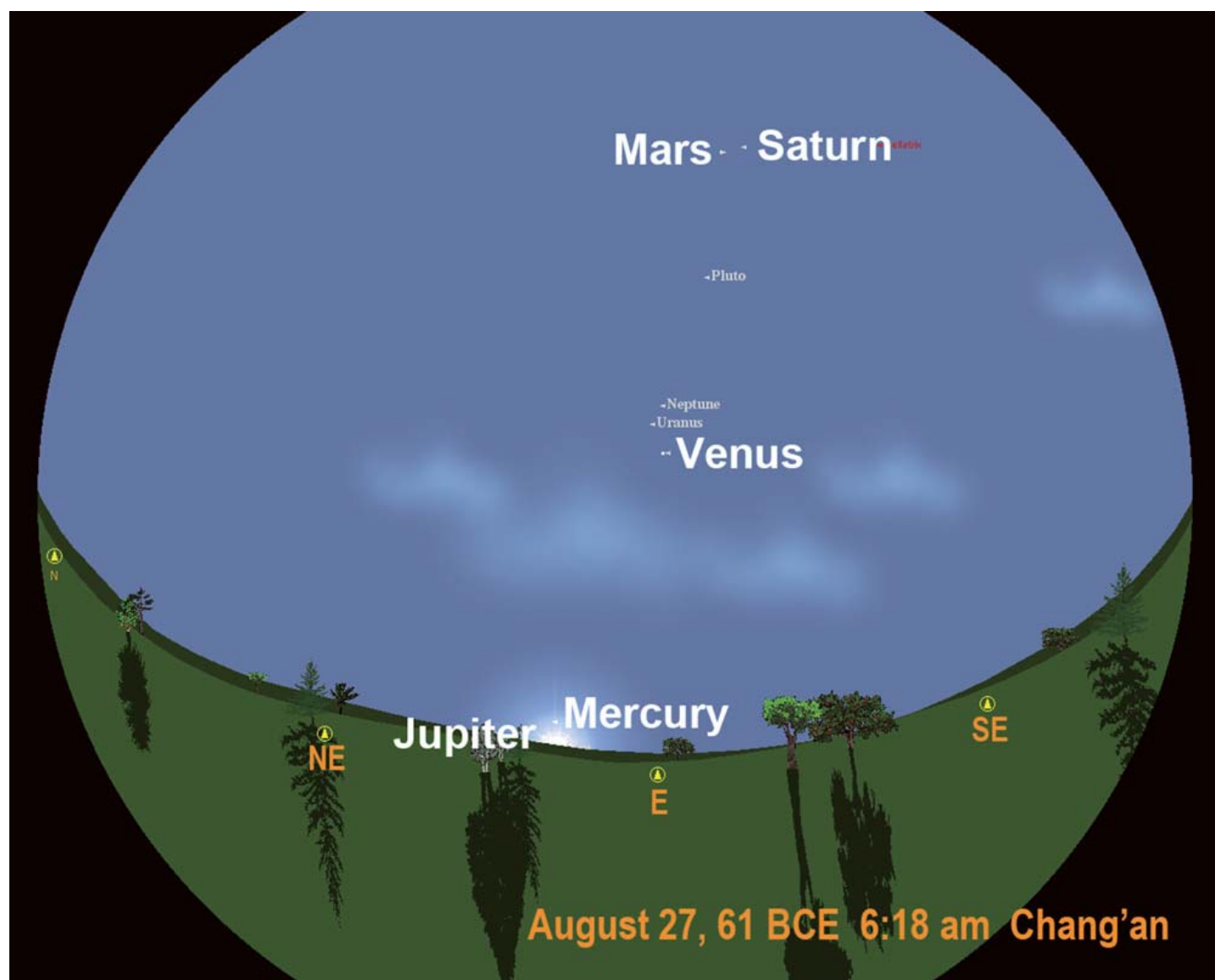


Fig. 6.2: The conjunction of the five planets as seen in Chang'an at 6:18 am on August 27 in 61 BCE (reconstructed by the author through “Starry Night Pro”).

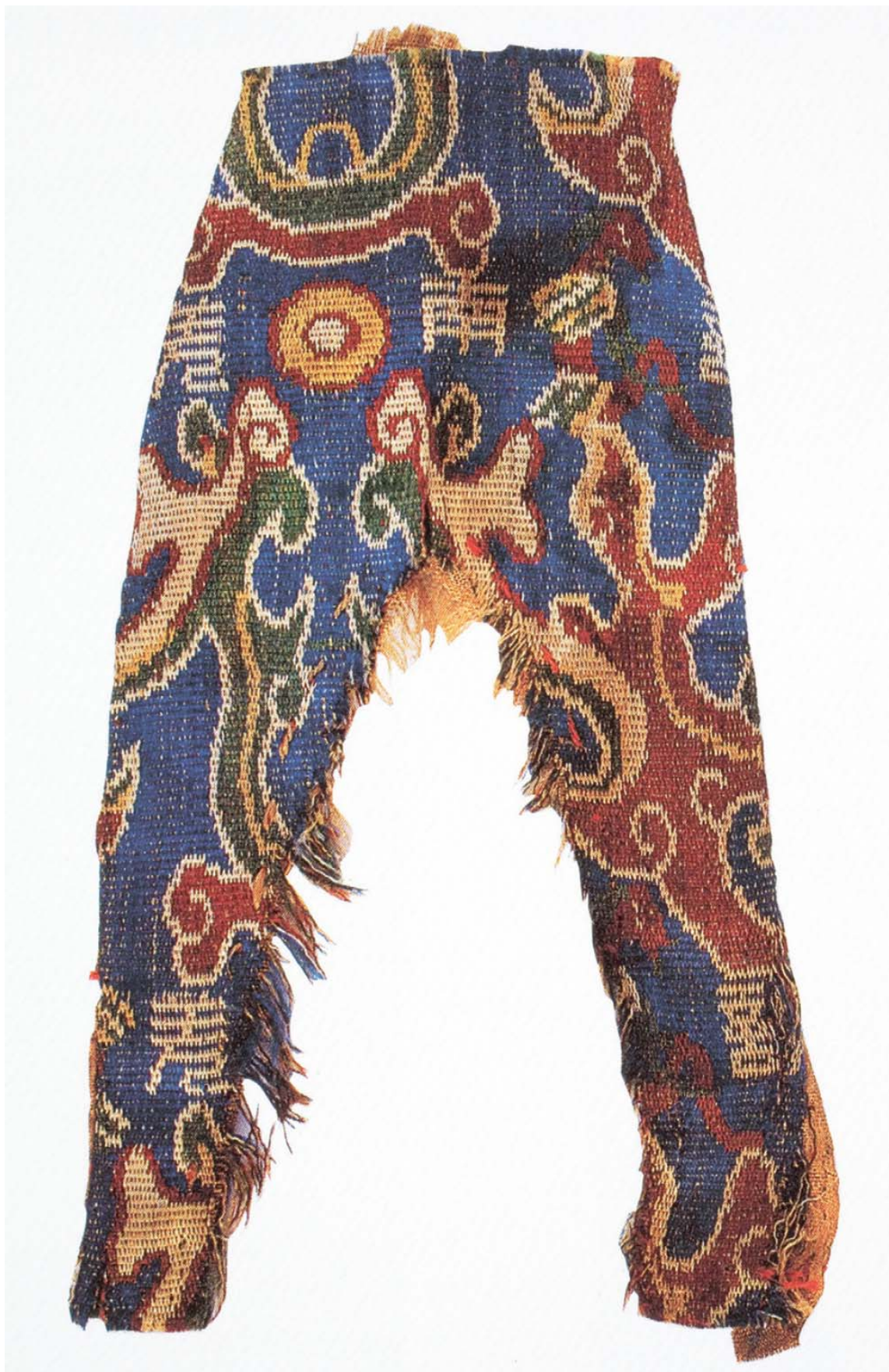


Fig. 6.3: Inscribed silk, 13.2 × 7 cm. Unearthed in 1995 at Niya, Xinjiang (photo: Zhao and Yu 2000, fig. 24-1; copyright and courtesy of Zhao Feng).

Many scholars believe that since both inscriptions were aimed at the Qiang people, the longer one must have had something to do with Zhao Chongguo's expedition. However, two facts prevent me from accepting that simple linkage. First, the brief and somehow forced use of a celestial sign did not compel General Zhao to battle the Qiang. Instead, he convinced the Emperor that war should be the last resort as far as the border

affairs were concerned. There would have been no reason for anyone to produce an inscribed textile to commemorate a celestial sign that marked no special occasion. Second, General Zhao's expedition took place in 61 BCE, but a radiocarbon test dates the tomb where the silk was found to 205±60 CE (Zhong 1999:2, 131). To better understand the inscribed celestial prognostication, we need to consider the text with its physical entity in contemporary material culture.

Design and ideology

The inscription about the five planets is part of the silk design. The characters are interwoven with a motif that features swirling clouds and various auspicious creatures such as birds, tigers, and winged unicorns. The inscription about the five planets may be rare, but the accompanying motif was quite popular.

The owner of this piece of silk, the male occupant of Tomb 8, wore clothes made of different silk fabrics all with similar designs (Fig. 6.5). The cotton trousers are edged with a blue-ground silk decorated with intertwined clouds, winged animals, and the inscription “[May you] have extended years and increased longevity; [may you] long preserve [your] sons and grandsons” (Fig. 6.6) (Zhong 1999: 2, 120; Zhao and Yu 2000, 32). The woolen caftan is decorated with two types of red-ground silk. The silk bordering the opening and sleeves of the caftan bears an inscription and a motif identical to those on the trousers (Fig. 6.7). The silk on the lower hem of the caftan has a design of curling clouds, auspicious creatures, and winged immortals and an inscription that, pieced together from fragments, could read, “Embroider a pattern of peace and happiness [and may it] fit [your] sons and grandsons well” (Fig. 6.8) (Zhong 1999:2, 120; Zhao and Yu 2000, 30–31). The silk fabrics in Tomb 8 thus follow convention by displaying both a propitious motif – auspicious creatures among clouds – and a propitious inscription. The three sets of inscriptions, which appeal to longevity, happiness, or victory, could well be interchanged.



Fig. 6.4: Inscribed silk reconstructed by Zhao Feng (photo: Zhao and Yu 2000, 25; copyright and courtesy of Zhao Feng).



Fig. 6.5: Male tomb occupant of Tomb 8 at Niya, Xinjiang (photo: Zhao and Yu 2000, fig. 1; copyright and courtesy of Zhao Feng).

Propitious designs on silk are found at other sites also, such as Tomb 2 in the Gutai cemetery at Loulan, near Lop Nur in the northeast of the Taklamakan Desert (Fig. 7.1). Sir Aurel Stein (1862–1943), when he discovered the tomb in 1914, took away fourteen pieces of silk fabric (Stein 1928:1, 225–259). Chinese archaeologists reexamined the tomb in 1980 and retrieved another seventy-four pieces of silk fabric (Xinjiang 1988). Among them is a piece of red-ground silk whose motif – intertwined clouds and winged animals – and

whose inscription, “[May you] have extended years and increased longevity,” are identical to those stitched on the clothing of the male occupant of Tomb 8 in Niya (Fig. 6.9).

The same motif also occurs in combination with different sets of blessings on other pieces of silk from Tomb 2 in Loulan, such as “Forever prosperity” and “[May you] be long-lived, bright, and brilliant.” The most unusual inscription from Loulan is “[May you] get a high promotion and a bright reputation; [all within] the four seas are glorious and wealthy; celebrate the longevity of the country” (Fig. 6.10) (Stein, 1928:1, 248; Xinjiang 1988, 34). Like the augury of the five planets, the wishes for good fortune on this silk go beyond personal happiness to include national welfare. The motif of auspicious creatures roaming among clouds and the four sets of inscriptions for prosperity, longevity, and celebration seen in Tomb 2 at Loulan could be interchanged, like those from Tomb 8 at Niya.

The dating of the silk fabrics from Loulan is uncertain because Stein and his assistants did not excavate Tomb 2 properly. But Tomb 1, at the center of the Gutai cemetery, was never disturbed by early explorers (Fig. 6.11). According to a radiocarbon test, the date of this tomb is 70±85 CE, which may offer a general time frame for the cemetery (Xinjiang 1988, 29).

A piece of silk recently found at Minfeng, south of Niya, provides a more precise date (Fig. 6.12a and b) (Zhao (ed.) 2005, 130). The silk was cut to make a bag. It bears the inscription “the first year of the Yuanhe reign,” or 84 CE. It also carries the design of auspicious animals and swirling clouds.

Together, these examples help us zero in on the Eastern Han, that is, the first and second centuries CE, as the period in which the motif of auspicious creatures and swirling clouds in combination with propitious inscriptions was a prevailing fashion in silk design.

The motif of auspicious creatures wandering among clouds was enormously popular in Han lacquerware as well. For example, Stein collected a lacquered casket painted with galloping animals among swirling clouds from an architectural site about 57 km southwest of the Gutai cemetery (Fig. 6.13) (Stein 1928:1, 201–202). Lacquered caskets decorated with a similar motif have not been found only on the western frontier: they have also been found along the northern and southern borders of the Han Empire, such as those unearthed at Hunyuan in Shanxi and at Guangzhou in Guangdong (Li 2002, 186–187, 200–201). Many exquisite items came from the interior of China, such as those found in Yangzhou, Jiangsu (Zhang 1995, 26–69). In all instances, the cloud pattern suggests that the creatures and other figures – winged or wingless – are roaming in a space high above the earth. Han people apparently believed that the otherworldliness of the motif would bring them good fortune and therefore incorporated the motif into the objects and textiles of daily use.



Fig. 6.6: Inscribed silk (detail of Fig. 6.5) (photo: Zhao and Yu 2000, fig. 01-2; copyright and courtesy of Zhao Feng).

The texts added to the textiles reinforced the auspiciousness of the motif. Most of the blessings emphasize the health, wealth, happiness, and social status of an individual, but some, like those on the silk fabric from Tomb 2 at Loulan, extend the blessing to the country. A piece of silk in a private collection in the United Kingdom has the auspicious motif with the inscription “In the Middle Kingdom [may] there be great prosperity; [may] the barbarians of the four quarters submit; slay the southern Qiang, enjoy tranquility, and [let] there be no end, as with Heaven” (Yu, Z. 2003). It is noteworthy that “slay the southern Qiang” figures in a prayer for an untroubled and thriving country.

The textile and lacquerware industries shared motifs in the same way that the textile and bronze industries shared similar inscriptions. The inscriptions on silk resonate in particular with those cast on contemporary bronze mirrors. For instance, we find the name of the Qiang people on the back of a bronze mirror unearthed in Mianyang, Hubei (Yao 1985, 87). The inscription reads:



Fig. 6.7: Inscribed silk (detail of Fig. 6.5) (photo: Zhao and Yu 2000, fig. 01-1-1; copyright and courtesy of Zhao Feng).

Master Long has made this mirror; [may] the barbarians of the four quarters submit; [may] many congratulations be on the house of [our] king and let the people get rest; [may] the Hu and the Qiang be removed and destroyed, and the world under Heaven be restored; [may] wind and rain come timely, and the five [grains ripen]; [may your] official position be august and illustrious, and [may you] be granted emoluments and food; [may you] long preserve [your] two parents and enjoy happiness without end.



Fig. 6.8: Inscribed silk (detail of Fig. 6.5) (photo: Zhao and Yu 2000, fig. 01-1-2; copyright and courtesy of Zhao Feng).

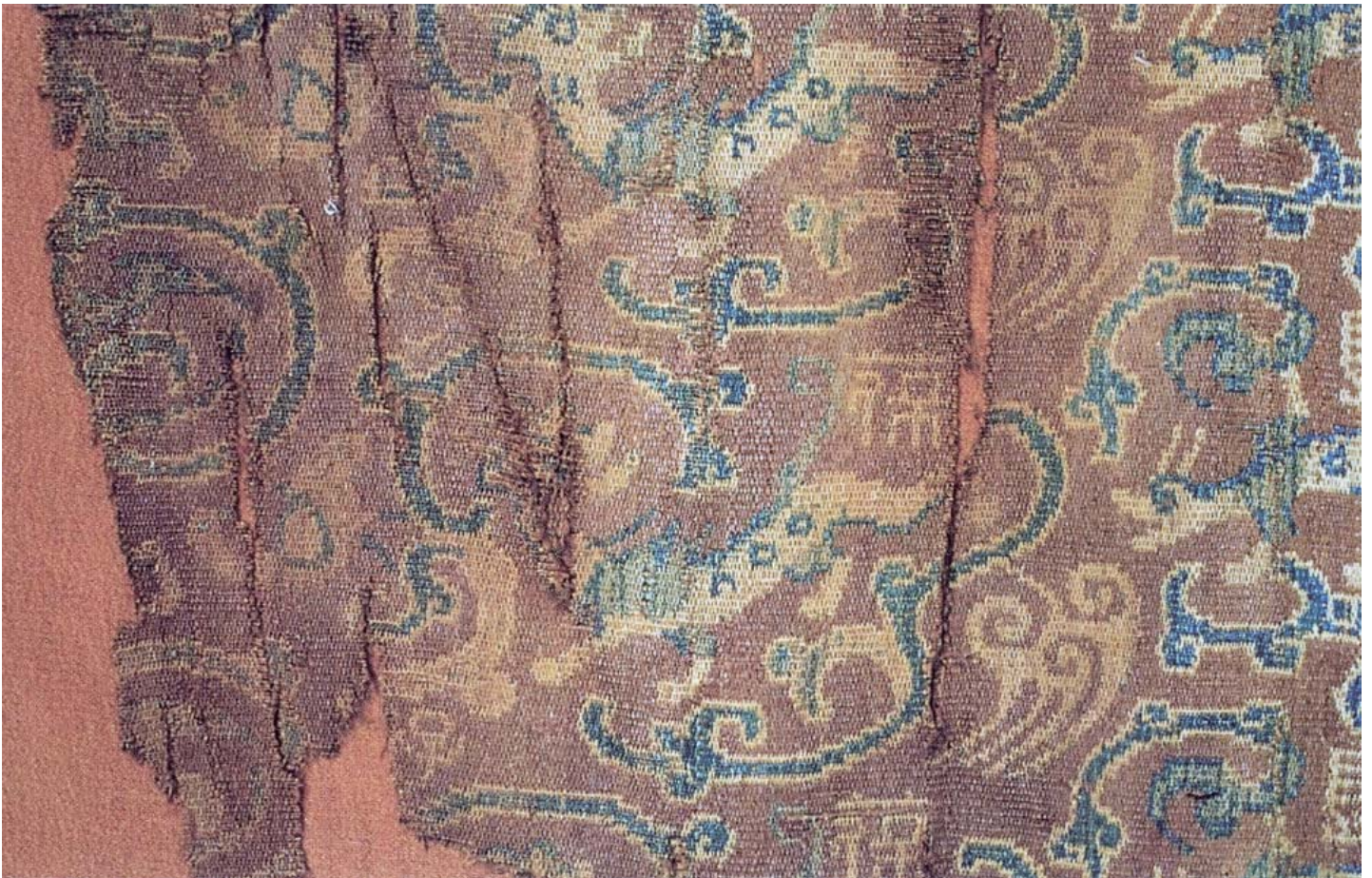


Fig. 6.9: Inscribed silk. Unearthed in 1980 from Tomb 2 in the Gutai cemetery in Loulan, Xinjiang (photo: Zhao and Yu 2000, fig. 01-2a; copyright and courtesy of Zhao Feng).

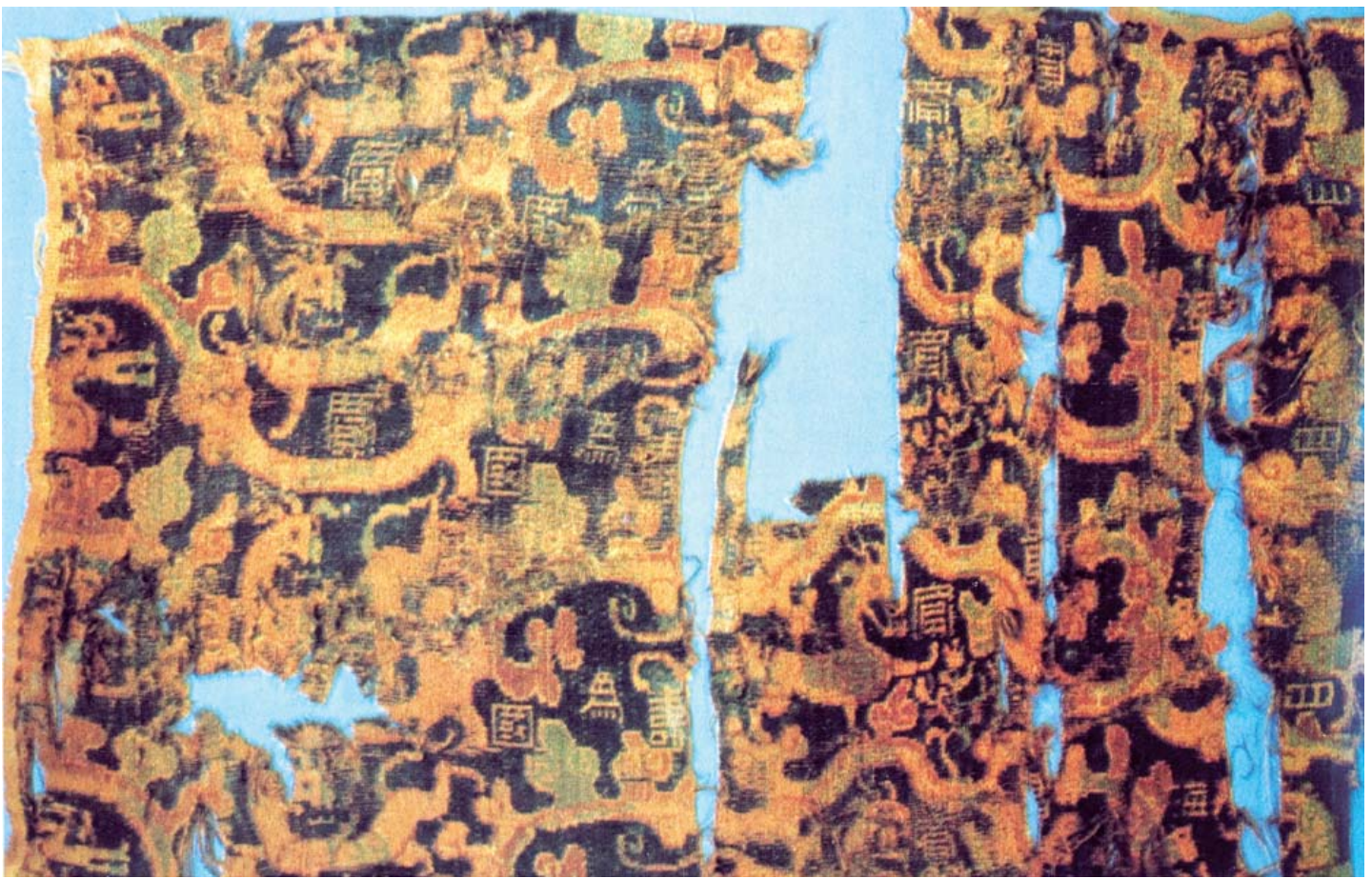
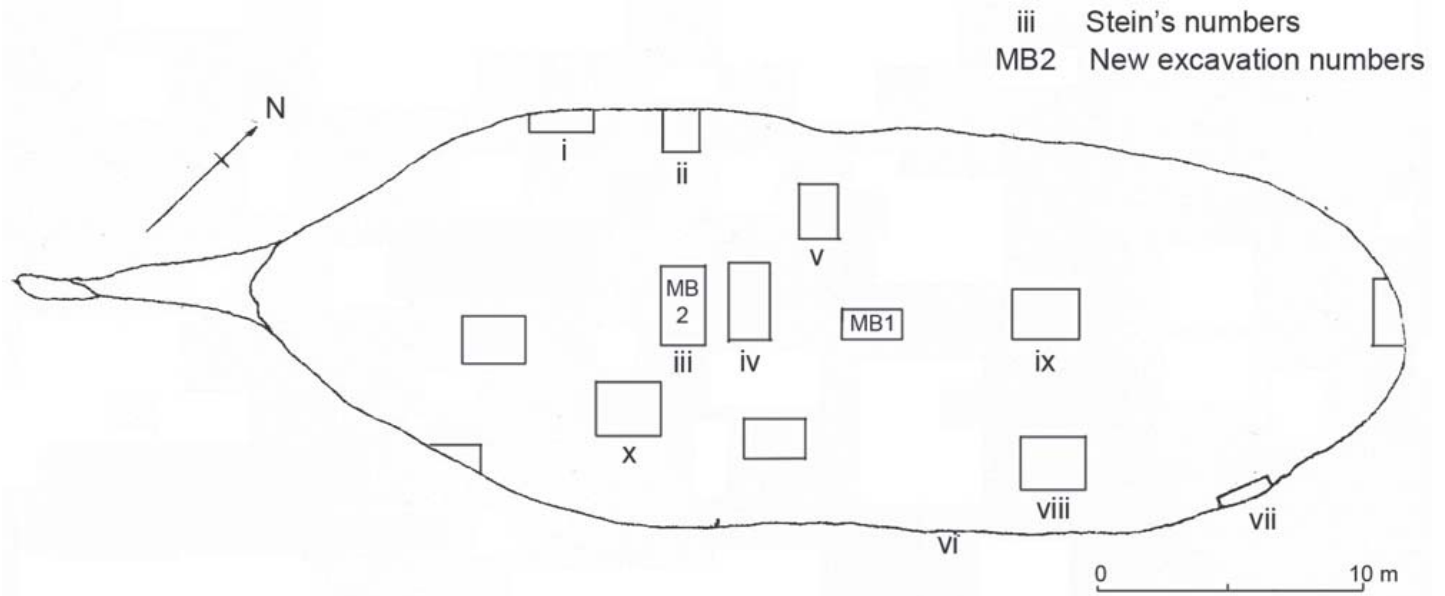


Fig. 6.10: Inscribed silk. Unearthed in 1980 from Tomb 2 in the Gutai cemetery in Loulan, Xinjiang (photo: Xinjiang Loulan kaogudui 1988, color plate).



Floor plan of the Gutai cemetery in Loulan

Fig. 6.11: Plan of the Gutai cemetery at Loulan, Xinjiang (after Xinjiang Loulan kaogudui 1988, fig. 19).



Fig. 6.12 a: Inscribed silk. Unearthed in 1998 at Minfeng, Xinjiang (photo: the author); b: Inscribed silk (detail of Fig. 6.12a). Unearthed in 1998 at Minfeng, Xinjiang (photo: Zhao 2005, 130; copyright and courtesy of Zhao Feng).

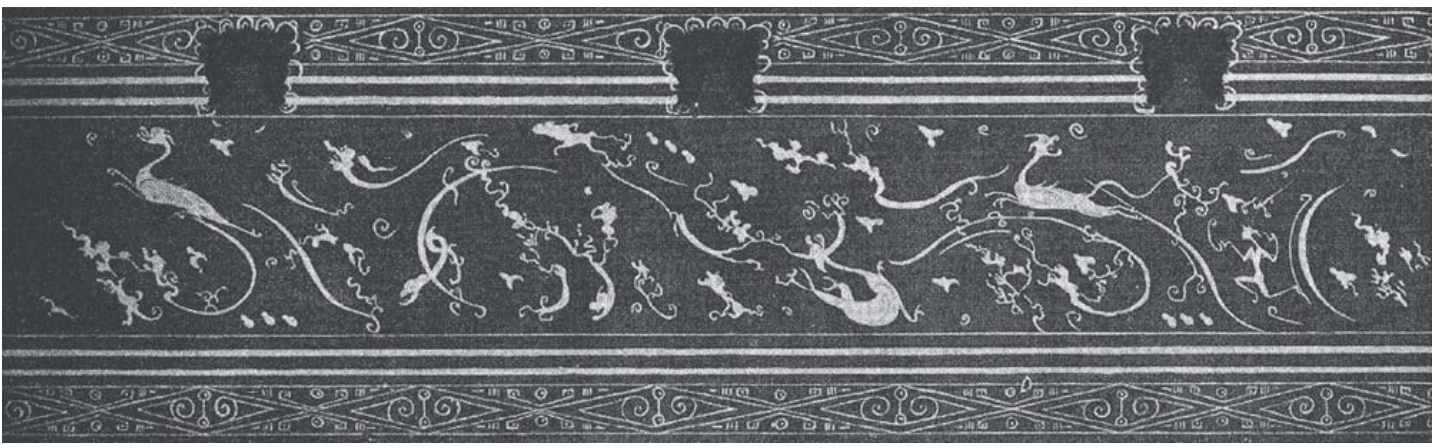


Fig. 6.13: Design on a lacquered casket. Drawing. Unearthed in Loulan, Xinjiang (photo: Stein 1928: 1: L. M. I. 02).

Vanquishing the “barbarian” neighbors was clearly for the purpose of ensuring the peace of the country and the Han people. Both outcomes were considered as significant and fortunate for individual advancement and family happiness.

The material culture of the Han people suggests, then, that the silk pieces with the inscriptions about the conjunction of the five planets and the conquest of the southern Qiang offer an alternative way to convey the wish for a truce or victory that would lead to the ultimate safety and prosperity of the land.

Context and signification

The juxtaposition of the Hu and the Qiang on the Mianyang mirror indicates that in addition to the Xiongnu people, the old enemy of the Empire, the Qiang people posed a new threat to the Eastern Han. Indeed, warfare broke out at least five times between the Qiang and the Eastern Han, with the conflicts lasting between 6 and 30 years. The battlefields stretched from the Hexi Corridor to the northern border; the flames of war even reached the vicinity of the old capital Chang’an. The frequent, large-scale conflicts caused not only heavy casualties but also a dramatic drop in population in the northwest: in the second century, the household count decreased by 95% in Beidi county and 90% in Jincheng and Longxi counties. Furthermore, the constant fighting exhausted the financial resources of the Eastern Han government, which had no choice but to burden the country with heavy taxes to meet military expenditures: it ran through 240 million *qian* in less than two decades (Fan 1982, 2878–2902; Ma 1984, 111–146).

The combat zone may have been far off in the northwest frontier, but the impact of the wars against the Qiang could be felt in every corner of the heartland. It is no wonder that “Quell the southern Qiang,” “Slay the southern Qiang,” and “May the Qiang be removed and destroyed” were inscribed on Eastern Han textiles and mirrors.

Textiles have seldom been unearthed in what was the heartland of the Han Empire (Zhao 2002, 8–18). The lack of evidence could easily lead one to assume that the silk fabrics with inscriptions about the five planets and the southern Qiang were designed for the frontier, either as a reward from the Han court or as a memento of Han triumph. Nevertheless, the larger context of Han material culture suggests that this is not the case. The prayer for the surrender of the barbarian neighbors was inscribed on mirrors circulated in the regions closer to the frontier (Shaanxi 1959, fig. 49; Sichuan and Chongqing 1960, fig. 31; Guangxi 1985, 210), but appeared even more frequently on mirrors used in areas far from the frontier (Honghu 1987; Hunan 1960, figs. 79, 80; Huang 1985; Wang, S. 1987, pls. 1–2, figs. 26, 28, 33, 34). The Niya silk, like comparable bronze mirrors, reveals more about the Han interest for an auspicious future than about the diplomatic or military reality. Instead of signaling a victory that the Han Empire had already enjoyed, the textile offers, in its

inscriptions and otherworldly motif, a hope for the peace that was yet to come, and records the anxiety of the Han people about the conflicts between the Empire and hostile minorities on the frontier.

On the other hand, the silk may well have had meaning for non-Han people in a non-Han context, not just for Han people in the Han context. The Chinese character “Han” can refer to either the Han dynasty or the Han ethnic group. To avoid confusion in this discussion, I will use “Han” for the Han dynasty and “Chinese” for the Han ethnic group.

The silk from Tomb 8 at Niya was cut to make an armguard for the male tomb occupant (Fig. 6.14). It was placed by his right side, together with a bow, arrows, a leather bow bag, and a quiver (Zhong 1999:2, 114). The tomb occupant was evidently a warrior. His corpse is well preserved. Archaeologists describe him as having a high-bridged nose, deep eye sockets, and a pointed chin. The craniometrical analysis concludes that he was a Caucasian (Zhong 1999:2, 114, 165, 170–173). This is not an exceptional case. More than five hundred mummies have been discovered in Xinjiang in the past five decades. The majority of them have been identified as Europoid, not Mongoloid (Mallory and Mair 2008).

The funerary context inevitably complicates our understanding of the silk. An apparent irony needs explaining here: a non-Chinese warrior adorned his armguard with a piece of silk inscribed with a wish to defeat people of his own kind. Could it have been that the ancient Caucasian warrior was illiterate, that he had the silk cut simply based on the design, with the intriguing winged unicorn at the center? Or could it have been that the warrior knew Chinese well enough to make an informed decision?

Archaeological evidence suggests the latter. It was Stein who discovered twelve bamboo slips with Chinese writing at Niya on his second expedition to Central Asia, in 1906. He acquired thirty more slips on his fourth expedition, in 1931. Not until 1993 did Chinese archaeologists retrieve two more slips in a Sino-Japanese joint excavation (Lin 2001; Wang, B. 2003, 90–93). One of the 1993 slips has been identified as a fragment from the *Cangjie Chapter*, a textbook for the study of Chinese characters popular both in the heartland and on the borders during the Han dynasty (Wang, Y. 1998). The bamboo slips as a whole indicate that there was a certain degree of literacy in the Niya region.



Fig. 6.14: Arm guard. Unearthed in 1995 at Niya, Xinjiang (photo: Zhao and Yu 2000, fig. 24-1; copyright and courtesy of Zhao Feng).

Most significantly, one bamboo slip reads, “The King of Jingjue, [a kingdom subordinate to the] Han,

obeyed the edict to manage affairs” (Fig. 6.15). The slip was unearthed on Stein’s fourth expedition. Although he had to leave all his finds behind this time due to protests on the part of the Republican government, he managed to bring back the photographs of his discoveries, which were preserved first in the British Museum and then in the British Library. He obtained as many as thirty bamboo slips with Chinese writing in 1931, but they were not transcribed and published until 1998 (Wang, J. 1998).



Fig. 6.15: Inscribed bamboo strip. Unearthed in 1931 at Niya, Xinjiang, inv. no. N. II. 2 (photo: Wang Jiqing 1998, 62, <http://www.bl.uk/ebli/1998articles/pdf/article3.pdf>. Pressmark of the photograph: T.O.37(J). Copyright and courtesy of the British Library Board).

The bamboo slip mentioning Jingjue confirms that Niya was in the Jingjue Kingdom. In the *Standard History of the Former Han*, Jingjue is described as a kingdom with 480 households, 3,360 people, and 500 excellent warriors (Ban 1990, 96a.3880). In the *Standard History of the Later Han*, Jingjue is introduced as one of the strategic stops along a southern route that led from the Hexi Corridor to the Pamir Plateau (Fan 1982,

88.2914–2915). In Han times the site would have been a lush oasis along the not-yet-dried-up Niya River. Today the site is located 100 km into the desert (Zhong 1999:2, 3).



Fig. 6.16: Inscribed pottery pot. Diameter 26.2 cm, height 32.4 cm. Unearthed in 1995 at Niya, Xinjiang (photo: Zhao and Yu 2000, fig. 2; copyright and courtesy of Zhao Feng).

Jingjue was officially part of the Han Empire when the Protectorate of the Western Region, which oversaw the kingdoms surrounding the Taklamakan Desert, was established in 60 BCE. The Protectorate ceased to function between 25 and 74 CE because the interior was in disorder at the beginning of the Eastern Han. The Protectorate was reinstated in 74 CE. The last Han intervention in regional disputes took place in 174 CE. The standard histories provide no record of the area after that (Lin 1996).

A pottery jar with the Chinese character *wang*, meaning “king,” was unearthed in the same tomb where the silk armguard was discovered (Fig. 6.16). The inscription indicates that the tomb occupant was probably a ruler of the Jingjue Kingdom (Zhong 1999:2, 115; Yu, W. 2000; Wang, B. 2003, 112–119). Judging from the radiocarbon dating of the tomb (205±60 CE), we know that the ruler could have been active in the second half of the second century.

If all the inferences stand, then the Niya silk was purposely cut to adorn the armguard by someone who comprehended the inscription. The silk, made by Chinese weavers, came into the possession of a ruler in the Western Region probably through the tributary system. By wearing the silk armguard with the inscription “The conjunction of the five planets in the East would benefit the Middle Kingdom,” the ruler of the Jingjue Kingdom asserted that he remained a faithful ally of the Han court.

Note

1 All translations from the Chinese unless otherwise noted are by the author.

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Domestic, wild or unraveled? A study on tabby, taqueté and *jin* with spun silk from Yingpan, Xinjiang, third–fourth centuries

Zhao Feng

Yingpan is an important site on the Silk Road, near Loulan in the east, Turfan in the north, and Niya in the south of China (Fig. 7.1). It lies at the southern foot of the Kuruk Tag Mountains, part of Xinjiang's Tianshan Mountain Range, and on the northwestern edge of the Kongque River delta. The Yingpan ruins consist of the ancient city, Buddhist monasteries, a beacon tower, and a large public burial ground. The Yingpan site, or the tombs in this site, can mostly be dated back to the third–fourth centuries. It was investigated by several western archaeologists, including Sven Hedin, Pyotr K. Kozlov, Aurel Stein, and others at the end of the nineteenth century and the beginning of the twentieth.

From 1989–1999, the Xinjiang Institute of Archaeology carried out three rescue excavations at the burial ground. Ten tombs were excavated in 1989 (Xinjiang Institute of Archaeology 1994), 35 tombs, including the most famous one, M15, in 1995 (Xinjiang Institute of Archaeology 2002a), and in 2000, all the remaining unexcavated tombs at this site were completely uncovered (Xinjiang Institute of Archaeology 2002b). All in all, several hundred Han- and Jin-Dynasty tombs were excavated, unearthing more than 800 wooden, textile, pottery, lacquer, and metal artifacts. The tombs are scattered on a tableland northeast of the ancient city of Yingpan, covering an area that measures 1000 m from east to west (“from east to north” in the original Chinese), and 250 m from south to north. Marked on the ground with walnut-wood poles, they take mainly one of two forms – a vertical earthen pit, or a chamber on the side of a vertical pit. Wooden burial vessels were found in most of the burial chambers. A very common type of coffin is a trough-shaped walnut-wood one placed upside down over the upper body of the corpse. Four-legged, chest-like coffins, some painted with enchanted beasts, clouds and round jade patterns on the exterior, encase the remains of members of the upper classes. Most of the corpses are buried singly, but there are individual cases of two or three buried together. All lie on their backs, with straight limbs. Their heads are wrapped in silk or cotton fabric, their faces are covered, and their bodies rest on a blanket or bed of reeds. The burial objects are mostly wooden, including small tables, dishes, cups and bowls. On the tables and dishes are placed goat heads, pairs of goat legs, peaches, grapes and olives. In addition, males are accompanied by bows, arrows and iron swords, while women have cosmetic cases, combs, mirrors and spinning wheels. The important finds caused a stir among academics both in China and abroad.

Because of the dry climate, some of the garments on the corpses have been preserved. The textiles found

from this site are partly similar to both the Turfan and Loulan sites, but some of them are found only in this site. The garments comprise a rich array of long and short robes, capes, skirts, trousers, boots, and shoes: they are made of silk, wool, cotton and hemp. The silk textiles include silk tabby, gauze, damask on tabby, twill damask, polychrome woven silk including warp-faced and weft-faced compound tabby, embroidery, tie-dyed silk and silk with applied gold foil. The woolen textiles are made in a variety of weaves: plain tabby and twill, compound weft weave, double weave, tapestry and carpet weave.

In 1995 a well-preserved polychrome coffin and a gorgeously dressed mummy were unearthed during the excavation of tomb M15. The discovery was rated one of China's ten major archaeological finds of 1997. Among the finds is a priceless garment, bearing woven patterns of human figures, beasts and trees that are typical of Hellenistic art (Zhao 2002, 41) (see also Fig. 8.16 in Angela Sheng's contribution in this volume). The mummy was exhibited in the Shanghai Museum in 1997 and traveled to Beijing, returning back to Urumqi afterwards.

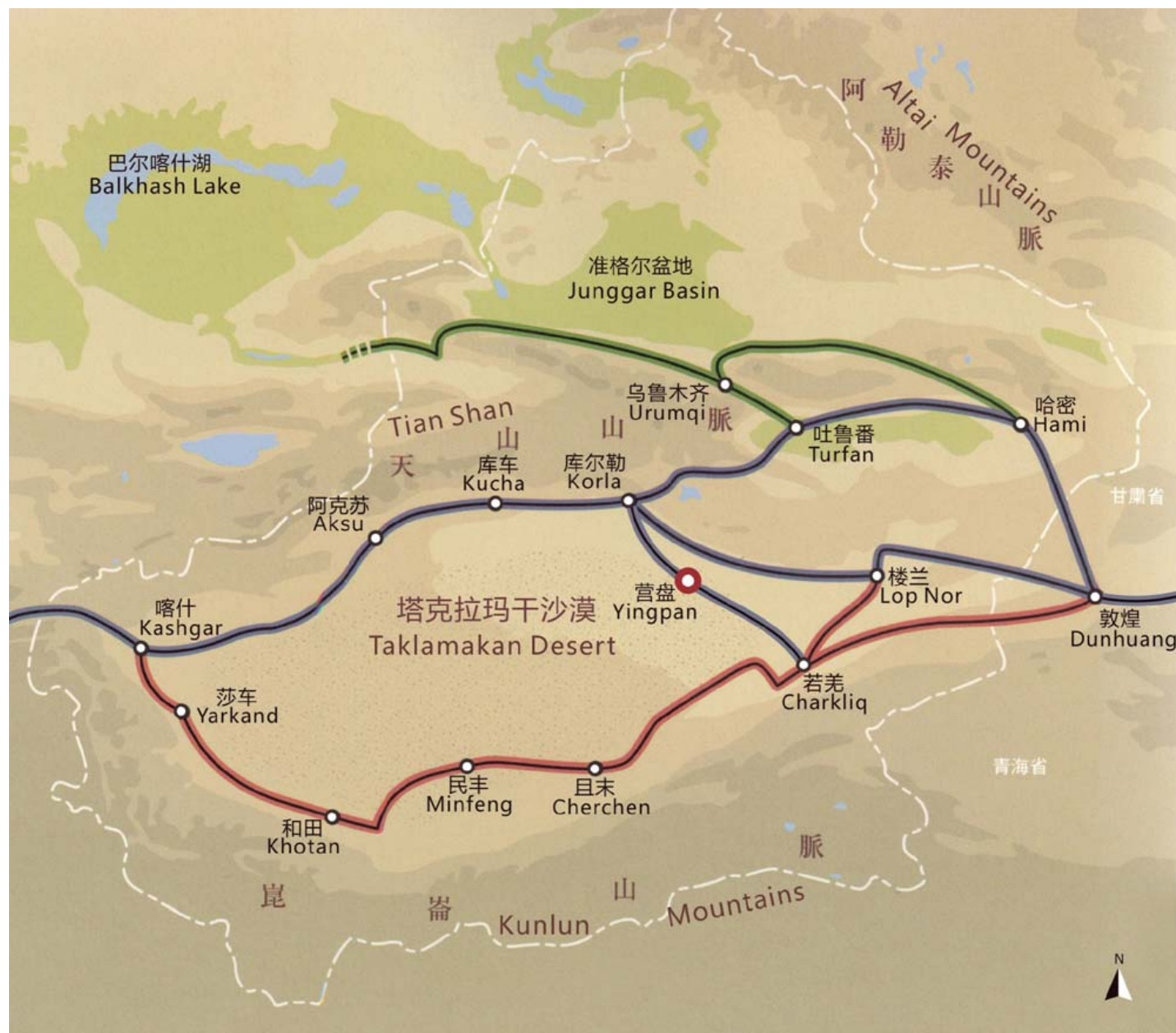


Fig. 7.1: Map of Yingpan (drawing: the author).

In 2004, the hottest summer in the history of Urumqi, Wang Ziqiang and I, from the China National Silk Museum in Hangzhou, were invited by the Xinjiang Institute of Archaeology to work on the conservation and restoration of the costumes, especially for that of the mummy from tomb M15. During the conservation and

studies, we found three types of silk fibers (Liu *et al.* 2011). Thus, this paper is based on our research: its aim is to answer the question of whether the silk fiber used for the spun silk textiles from Yingpan is domestic, wild or unraveled from Central Chinese silk?

Analysis of fibers from the spun silk

There are three types of silk textiles woven with spun and twisted silk threads: silk tabby, warp-faced compound tabby, the so-called *jin* silk in Chinese, and weft-faced compound tabby, the so-called taqueté in the textile terminology (see also Figs. 8.1 and 8.2). Two examples from each of the three types were selected for the analysis – the results are shown below.

Silk tabby

The first type is silk tabby woven with spun silk, twisted strongly in a Z direction.

No. 1 (M15:4): Purple silk tabby embroidered with a pearl and rosette pattern, used as trousers, from the male mummy of M15 (Figs. 7.2–7.4).

No. 2 (M2:5): Embroidered silk tabby, used as a pillow, found in tomb M2.



Fig. 7.2: Enlarged detail of silk tabby (M15:4) (photo: the author).

<i>Silk tabby</i>	<i>No. 1 (M15:4)</i>	<i>No. 2 (M2:5)</i>
Thickness	medium (70–80 μm^2)	small (30–40 μm^2)
Fullness	full	full
Variation of size	small	small
Twist	uneven	uneven
Weave	tabby	tabby

Spun *jin*-silk ribbon

The second type is *jin*-silk ribbon with a very narrow loom width, normally 2–3 cm, on which both the warp and weft were spun silk, twisted strongly in a Z direction. The basic weave structure of the silk ribbon is a 1:1 warp-faced compound tabby, exactly the same as the weave structure of the classical Chinese Han *jin* silk. The pattern was always repeated three times within the loom width, i.e., horizontally, in different color combinations, but it was not necessarily repeated in the warp direction.

No. 3 (M14:9a): *Jin*-silk ribbon with very simplified animal images, used as a vertical border on a jacket from M14. Gold foil was attached to the ribbon and could still be found when it was excavated (Figs. 7.5–7.7).

No. 4 (MC:30): Another *jin*-silk ribbon fragment, used as a band around the waist, from MC:30.

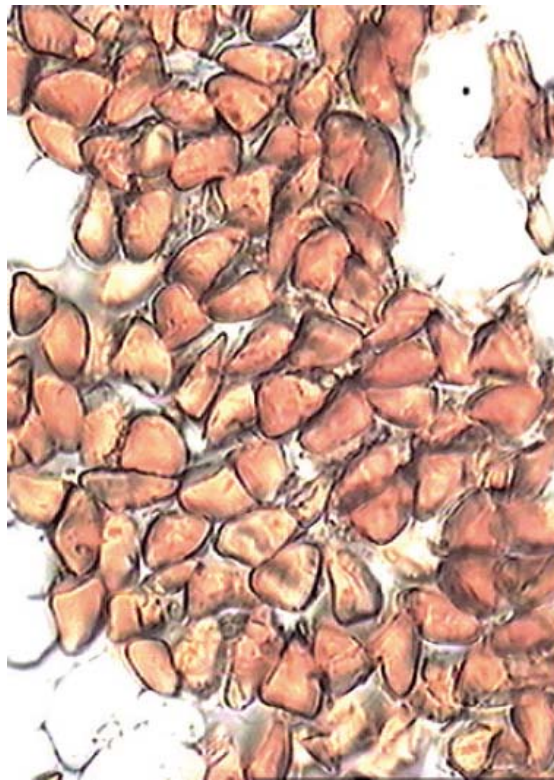


Fig. 7.3: Cross-section of warp (M15:4), scale: 20 μm (photo: the author).

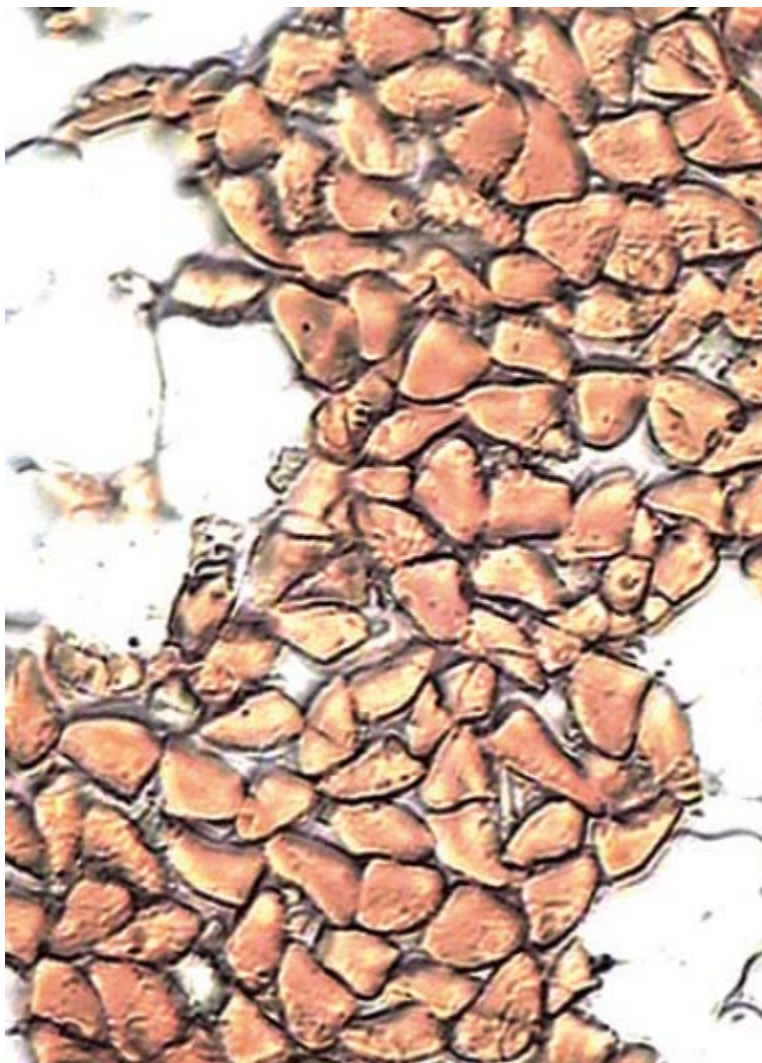


Fig. 7.4: Cross-section of warp (M15:4), scale: 20 μm (photo: the author).

<i>Jin ribbon</i>	<i>No. 3 (M14:9a)</i>		<i>No. 4 (MC:30)</i>	
	warp	weft	warp	weft
Thickness	thin	medium	medium (50 μm^2)	medium (50 μm^2)
Fullness	medium	full	full	full
Variation of size	small	large	small	small
Twist	even	even	even	even
Weave	warp-faced compound tabby		warp-faced compound tabby	

Silk taqueté

The third type is silk taqueté. Both warp and wefts are spun silk, twisted strongly in a Z direction. It was woven in 1:1 weft-faced compound tabby, but with three colors in total. The warp is normally red. The inner warps are always in pairs, but the outer warp is single. The wefts are always in three different colors.

No. 5 (M1:9): Silk taqueté found under the lower jaw of the corpse from tomb M1 (Figs. 7.8, 7.9, 7.10, 7.11).



Fig. 7.5: Sample of jin-silk ribbon (M14:9a), scale: 2 cm (photo: the author).



Fig. 7.6: Cross-section of warp (M14:9a), scale: 20 μm (photo: the author).

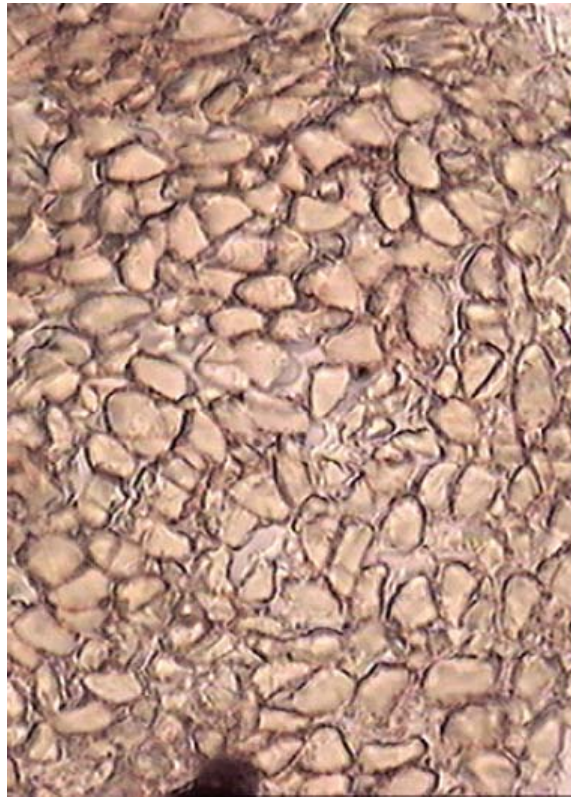


Fig. 7.7: Cross-section of weft (M14:9a), scale: 20 μm (photo: the author).



Fig. 7.8: Sample of silk taqueté (M1:9), scale: 2 cm (photo: the author).

No. 6 (M66:1–2): Silk taqueté, originally found in a cosmetic box in M66.

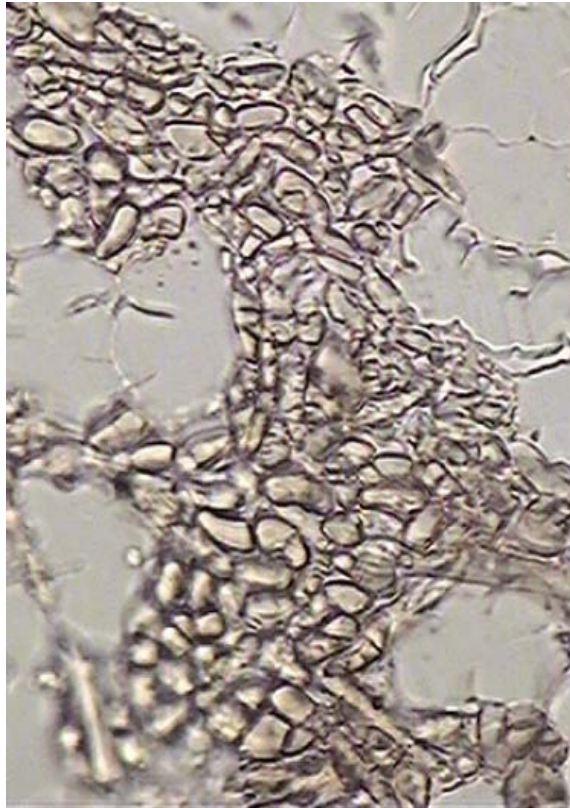


Fig. 7.9: Cross-section of warp (M1:9), scale: 20 μm (photo: the author).



Fig. 7.10: Cross-section of red weft (M1:9), scale: 20 μm (photo: the author).



Fig. 7.11: Cross-section of yellow weft (M1:9), scale: 20 μm (photo: the author).

Similar silk taqueté was also found at Munchak-Tepe, Fergana Valley, Uzbekistan. The analysis results are similar to those for the Yingpan finds.

<i>Taqueté</i>	<i>No. 5 (M1:9)</i>			<i>No. 6 (M66:1–2)</i>		
	warp	red weft	yellow weft	warp	red weft	yellow weft
Thickness	medium (46)	medium (51)	thin (34)	thick	medium	thin
Fullness	flat	medium	flat	full	full	flat
Variation of size	large	small	large	small	small	large
Twist	even	even	even	uneven		uneven
Weave		taqueté			taqueté	

Comparable analysis

Silk tabby and damask

A study of the silk used for tabby and for damask, which definitely originated from Central China, was conducted.

No. 7 (M15): Silk tabby from a head cover of the male mummy from M15.

No. 8 (M14:9): Red silk tabby with gold foil from M14.

No. 9 (M14): Silk damask with lozenge pattern. Weft floats on tabby ground (Figs. 7.12–7.14).



Fig. 7.12: Sample of silk damask (M14), scale: 2 cm (photo: the author).

No. 10 (M14:9b): Silk tabby in red, with gold foil on the bottom border of a jacket from M14.

No. 11: Silk damask with a check pattern in green from Yingpan. (Without tomb number)

Silk floss

Another comparison with the silk floss found in Yingpan, probably originating from Central China, was also studied (Fig. 7.15).

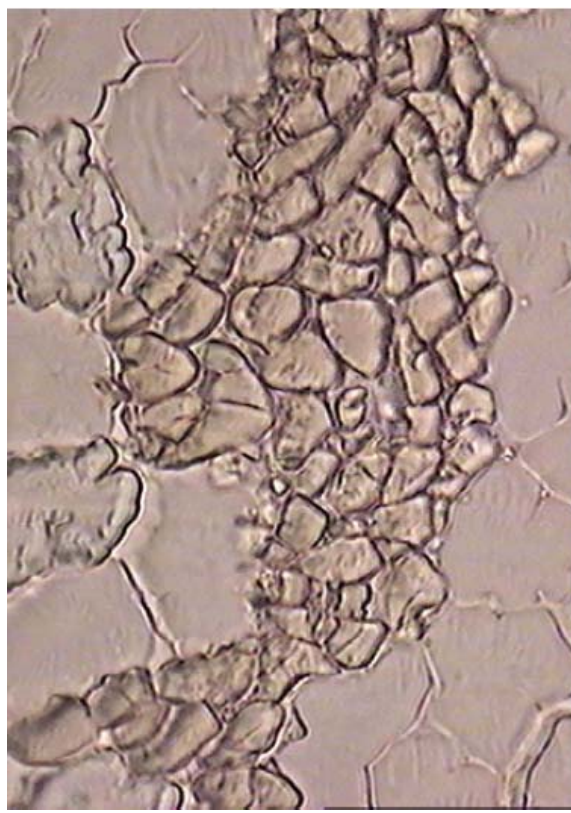


Fig. 7.13: Cross-section of warp fiber (M14), scale: 20 μm (photo: the author).



Fig. 7.14: Cross-section of weft fiber (M14), scale: 20 μm (photo: the author).

	<i>No. 7 (M15)</i>	<i>No. 8 (M14:9)</i>	<i>No. 9 (M14)</i>	<i>No. 10 (M14:9b)</i>	<i>No. 11 (No number)</i>
Thickness	thin	thick	thick	thick	thick
Fullness	medium	full	full	full	full
Variation in size	small	small	small	small	small
Twist	no	no	no	no	no
Weave	tabby	tabby	floats on tabby	tabby	tabby and twill

	<i>No. 12 (M15)</i>	<i>No. 13 (M7)</i>	<i>No. 14 (M7)</i>	<i>No. 15 (M31)</i>	<i>No. 16 (No number)</i>
A thickness	thick	thick	thick	thick	thick
B fullness	full	full	full	v	medium
C variation of size	large	large	large	large	large

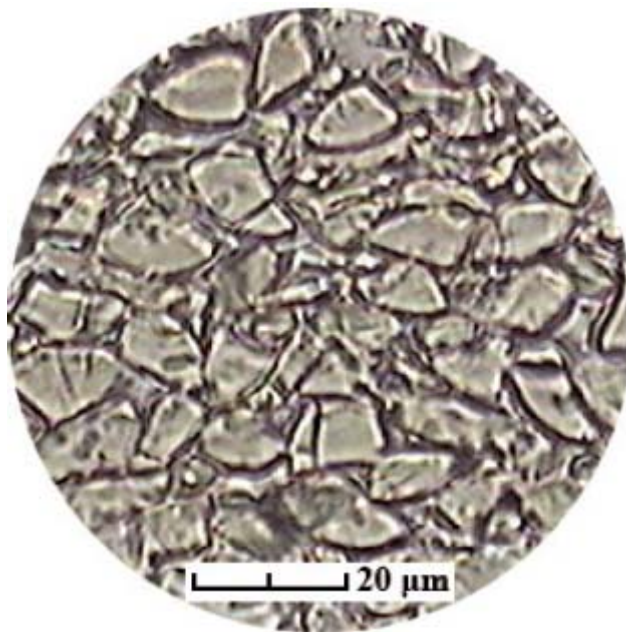


Fig. 7.15: Cross-section of silk floss (photo: the author).

Discussion: domestic, wild or unraveled?

Based on the research made by Irene Good, there are three areas where people used workable silk to make textiles: Europe, India and China. Current evidence reflects three distinct families of silkmoths, each for one area. The first is the Euro-Mediterranean family, dominated by the silk from the *Pachypasa otus* silkmoth. The second area cluster is central-south Asia, which comprises several *Antheraea* species. The Chinese-Mongolian-East Siberian cluster is composed of *Bombyx*, as well as the occasional *Antheraea pernyi* (Good 1995).

Irene Good also made the amino acid analyses for all the species of silks, and found special proportions

of different amino acids, especially glycine, alanine, serine, aspartate, and arginine (Good 2010).

Species	Bombyx mori	B. mandarina	Antheraea assamensis	Pachypasa otus
Glycine	43.74	32.38	26.70	27.1
Alanine	28.78	25.53	38.70	21.10
Serine	11.88	12.18	9.60	7.20
Aspartate	1.28	1.58	4.59	8.80
Arginine	1.83	0.84	9.43	25.50

However, the amino acid analyses of silks from Yingpan show that all of them are domestic silk, meaning that they come from the *Bombyx mori* silkworm, as can be seen from the proportion of Glycine:Alanine:Serine=4:3:1 (Fig. 7.16).

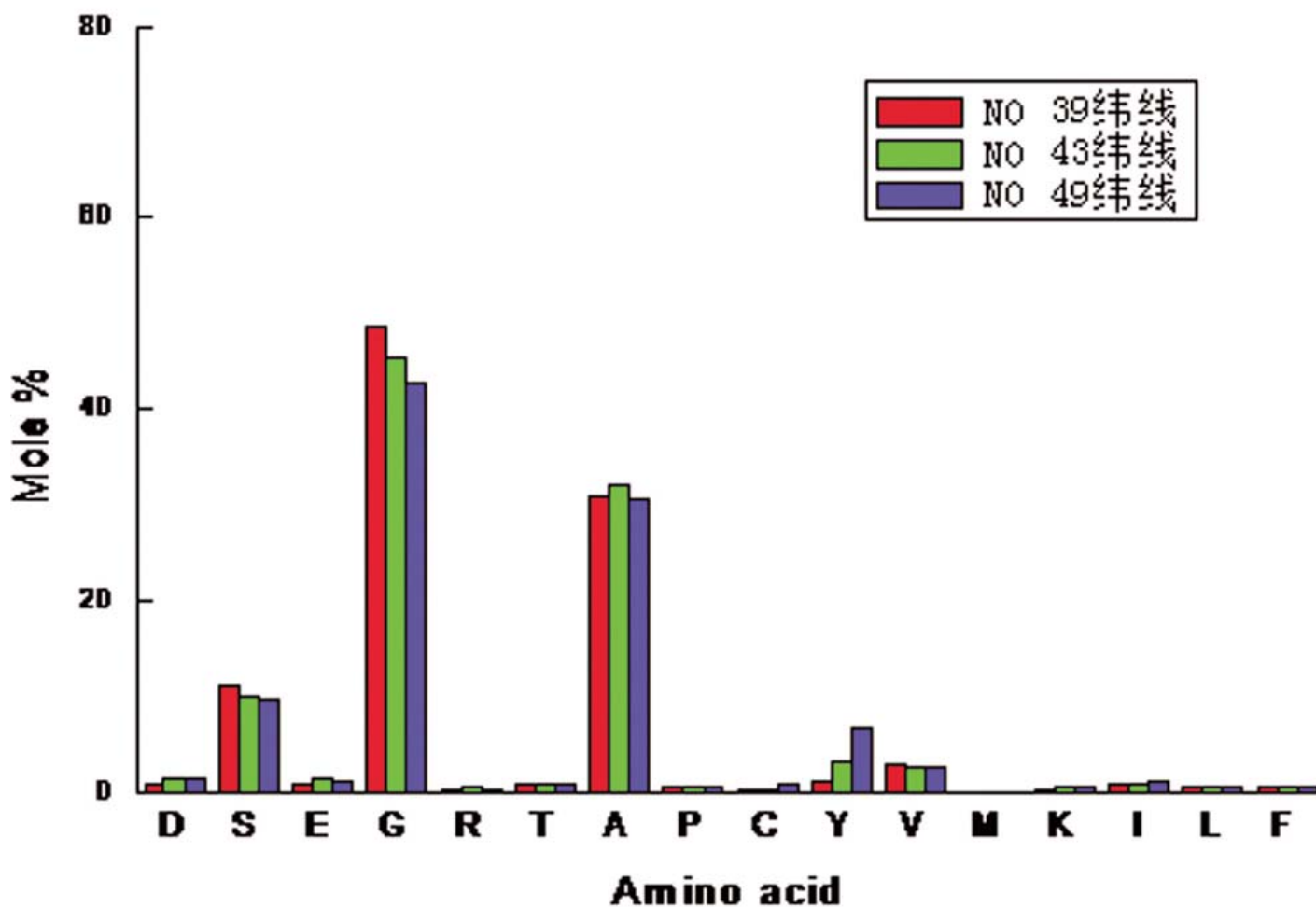


Fig. 7.16: Amino acid analysis of silks from Yingpan.

In this case, we need only to consider the silk from the East and local products from the Yingpan area because the East used *Bombyx mori*, and the local Yingpan area also used the silk and silkworm imported from the East. According to Chinese historical documents, domestic silk materials found in northwest China during the third–fourth centuries may have had three sources:

- flat silk threads reeled from cocoons, from the silk fabrics woven in Central China. This is a normal technique widely used in most of Central China.
- silk floss unraveled from cocoons, also from Central China where it was very popular. According to many documents, the floss was also exported to the Silk Road.
- silk cocoons, which were most likely produced by the Chinese domestic silkworm but grew locally, in Xinjiang. A local story recounts that a princess brought the silkworm egg from the eastern Kingdom,

probably China or Shanshan, to Khotan (Xuanzang 2000). Thus, the cocoons produced in Xinjiang were from *Bombyx mori*. Both Chinese official documents and manuscripts excavated from Turfan narrated that the local people raised the silkworms to make the silk floss padding or spin the silk threads.

After the analysis of the cross-section of silk fibers, we found three levels of the thickness of each single silk filament: thick=85 μm^2 ; medium=50 μm^2 ; thin=30 μm^2 ; all could be made in Central China but in different qualities. We also found that there are three levels of the triangle shape based on the proportion of the short diameter to the long diameter, so-called fullness or flatness: full, medium, and flat. The flat one was probably produced only in Xinjiang.

When the silkworm spins, the silk filament is normally thin and has an irregular cross-section in the beginning and the end, so the floss on the outside of the cocoon and inside the cocoon is not of good quality. People will use this kind of silk only for floss and padding. However, the silk from the main layer of the cocoon, which is regularly thick and strong, can be reeled to make a raw silk through a reeling mechanism.

Thus, the variation of the size and of the fullness will play a very important role in our discussion, through which some ideas could be obtained as below:

1. Little variation or good uniformity means that the silk was obtained through a reeling process. Only Central China had such a process to produce this kind of silk, so all the silk tabby or damask with flat silk must come from Central China.
2. A large variation of cross-sectional sizes means that the threads were made from silk floss. But there are two cases from Central China where some of them are thick, and from the local Xinjiang area where they are all thin.

Let us try to explain our analysis result in the tables below:

	Thickness: thick	Thickness: medium	Thickness: thin
Small variation in cross-sectional size			
Fullness: full	A	A	A
Fullness: medium	A	A	A
Fullness: flat			
Large variation in cross-sectional size			
Fullness: full	B		
Fullness: medium			
Fullness: flat		C	C

Based on the above principle, we could have three types of silk threads, A, B and C.

Type A: thick and full with small variation means that the silk was reeled. It could have been unraveled from silk tabby or damask. Most of the silk tabby made from spun silk, such as No. 1 (M15:4) and No. 2 (M2:5), could have been woven with unraveled silk from Central China. Most of the silk threads in *jin* ribbons, such as the warp of No. 3 (M14:9a) and No. 4 (MC:30), were also possibly made from unraveled silks.

Type B: thick but with large variation could be made of silk floss from Central China. A good example could be the weft of the *jin*-silk ribbon No. 3 (M14:9a).

Type C: thin, with large variation, could be made of silk floss from the local Xinjiang area. The yellow wefts of taqueté, No. 5 (M1:9) and No. 6 (M66:1–2), could be examples of this type.

Questions: who unraveled the Chinese silk?

Yu Huan, from the Wei State during the Three Kingdoms period, wrote the following story in the *Weilüe* (which was finished around 254 AD): to obtain the benefits from the Chinese silk, the people from the so-called Daqin country unraveled the silk and reweave the threads into western-style damask, then traded the damask down the line to Persia and other countries (including India) (Chen Shou 2007, as recorded in the *Weilüe*).

There are some questions which were always asked based on this story.

Why did they want to unravel and reweave?

The answer is presumably that those people who unraveled the silks loved the material but did not like the style in which they were made, so they tried to reweave the silk in a local style. Among the excavated textiles, the patterns on the silk taquetés were sometimes Western, similar to the wool taquetés.

How did they unravel the silk?

To answer this, we have to ask about the unraveling method. We could probably guess that the best method is to separate each warp and weft to have new warp and weft threads. In this case, the longest silk thread could be the width of the fabric, i.e., 50 cm. But a thread this length is almost impossible to use to weave a new fabric. You have to connect all the threads unraveled from the original fabric before you can weave it. So spinning and twisting all the silk threads from the original fabric into a spun silk thread is the best method to make a new warp and weft from which a new fabric could be woven.

Many spinning wheels and spindles, which are the best tools for producing new silk thread, were excavated both in the East and the West: in particular, significant numbers have been found in Xinjiang.

Where did the Daqin people live?

The most popular definition from Chinese scholars for “Daqin” is the Roman Empire, or more precisely the eastern Roman Empire. But some other scholars considered Egypt, Bactria or Syria, even India, as possibilities. The most recent suggestion by Wang Ting says that there were two groups of Daqin people. One of them, in the West, was Roman, and the other, in the East, was located in central Asia. Those people lived first in Xinjiang, then moved into central Asia after the Han period (Wang 2005). Looking at the results of our research, the second explanation sounds reasonable and acceptable.

When did the Daqin people unravel Chinese silk?

The *Weilüe* was written by Yu Huan, around 254 AD. The things he took up in his book most probably occurred in the early 3rd century. This dating is quite consistent with the spun silks excavated at the Yingpan site.

Conclusion

From both the historical records and excavated documents, the sericulture in the Xinjiang area began in the third century, but with very local characteristics. The most important one is using the spun silk for the warp and weft in weaving. This was also indicated by the excavated textiles in the Xinjiang area, especially from Yingpan. Furthermore, the analysis of silk threads, mainly the cross-section, from the archaeological finds provides more information and shows the possibility that a certain number of woven silks from Central China were unraveled and then spun into new threads and woven into the local textiles, including tabby, *jin* ribbon and taqueté.

In order to answer all the questions raised here, however, there is still more work we need to do:

1. to decide where those silks were from, Central China or local? Making this determination requires more scientific evidence. One of the possible methods is isotopic research, which could probably tell whether the silk was local or from far away.
2. to decide whether the silk came from domesticated silkworms, *Bombyx mori*, or wild silkworms, *Bombyx mandarina*, or a domestic silkworm variation arising after the move into Xinjiang. One possible method to determine this could be based on fibroin or amino acid analyses. Both of these steps could be followed by our next stage of research.

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Chinese silks that circulated among peoples north and west: implications for technological exchange in early times?

Angela Sheng

At the International Symposium on “The Silk Trade: Exchange along the Silk Roads between Rome and China in Antiquity” convened by Berit Hildebrandt on April 20–21, 2012, at Harvard University, I was asked to respond to three papers. Lillian Lan-ying Tseng spoke on “Text and Textile: Inscribed Brocade in the Tarim Basin,” and Zhao Feng presented “The Silk from the Silk Road: Wild and Domestic, or Reused? A Study on Tabby, Taqueté and *Jin* with Spun Silk from Yingpan, Xinjiang, third–fourth Centuries CE.” Both papers were revised for this volume to reflect the general discussions. Due to extenuating circumstances, Irene Good could not deliver “From Han Silk to *Samitum* – Early Compound Weaves and Loom Technologies in Late Pre-Historic Inner Asia” as planned so that at the time I outlined the major points of her 2001 article, “Archaeological Textiles: A Review of Current Research,” supplementing it with my own understanding of the development of textile technology in China and beyond (Sheng 1999). Sadly, she passed away in early 2013 – a great loss to the field.

The 2012 Symposium at Harvard focused on one important aspect of a multifaceted cultural exchange between two major civilizations in early times – Greco-Roman on the shores of the Mediterranean in the Western world and in the East, Chinese of unified Qin and Han dynasties: the silk trade along the Silk Roads. Coincidentally, Chinese silks also featured prominently in a large-scale exhibition, *Qin-Han and Roman Civilizations* in Beijing in 2009. Organized by Art Exhibitions China, the Beijing World Art Museum and Mondo Mastre, this exhibit featured hundreds of rare finds from both China and Italy. Prominently displayed were examples of Chinese silks from Mawangdui (dated to 168 BCE), products of the ancient Chu culture in today’s Hunan province of central China, and from Loulan and Niya (dated to 250–330 CE) belonging to the ancient Kroraina Kingdom in today’s Uyghur Autonomous Region of Xinjiang of northwestern China. As well, the exhibit included two representations of weaving, one carved in stone from the eastern coastal Jiangsu province showing a woman seated at a slanted loom (more below) and the other, cast in bronze, from the inland southwestern Yunnan province showing women weaving with back-strap looms on the ground (both dated to the Eastern Han, 25–220 CE) (*Qin Han* 2009, 120–121).

In contrast, while Roman painted murals and statues on display show both male and female figures clothed in fabric with many folds, these representations cannot confirm the fiber of the clothing, whether silk, wool, linen, or cotton. However, Peter Fibiger Bang and Beate Wagner-Hasel presented textual analysis on this topic at this Symposium, commented on by Marie-Louise Nosch. The narrower focus of this Symposium only

on the silk trade also made it possible to discuss the cultural exchange between ancient Rome and China as an indirect one, relayed from region to region along the east-west Silk Road arteries, as presented by Liu Xinru and Thelma K. Thomas. The focus on silk also highlighted the significant intermediation of early inhabitants of the South Asian continent, argued by J. Mark Kenoyer and in keeping with Zhao Feng's findings. The focus on silk, however, largely excluded the vital input of the wool-making and wool-wearing pastoral nomads living on the expansive northern steppes (Sheng 2010), not to mention the wool production around the eastern Mediterranean shores that supplied the Roman military with woolen fabric for their uniforms (Nosch 2012).

Writing after the Symposium, I can now refer to two new works published in late 2012 that pertain to the topics covered at the Symposium: first, Valerie Hansen's *The Silk Road: a New History* (Hansen 2012), and second, *Chinese Silks*, the English version of which was edited by Dieter Kuhn based on the Chinese version edited by Zhao Feng (Kuhn and Zhao 2012). In addition, a most useful tool appeared in a special issue of the *Journal of the Royal Asiatic Society* in 2013. As part of the 2007–2010 project on *Textiles as Currency* (initiated by Helen Wang, curator of coins at the British Museum and Valerie Hansen at Yale University, with an on-site visit in 2010 to the National Silk Museum, the Director of which is Zhao Feng), Zhao and Wang Le compiled a *Glossary of Textile Terminology (Based on Documents from Dunhuang and Turfan)*. It cross-tabulates excavated Chinese textiles with their extant textual references, and ranges in time from approximately the fourth to the tenth centuries CE.

As the 2012 Harvard Symposium examined the exchange between Rome and China in antiquity, the relevant time period ends in the late fifth century, after the Roman Empire gave way to the Byzantine in the West. In the East, China continued to experience changes in leadership following the collapse of the Han dynasty in 220 CE: Three Kingdoms (220–265), Western Jin (265–316), and Eastern Jin and Sixteen Kingdoms (317–420). These politically fluid centuries in China witnessed the migration of people fleeing from war-torn areas and the instability that inadvertently led to major technological innovations in silk weaving. Here then I aim to address the question of whether any weaving technologies were transferred between the Roman Empire in the West and the Chinese Empire in the East in the early centuries. This was in fact the topic that the late Irene Good would have presented. However, I cannot claim as my own the argument that she would have imparted and can only present my own analysis grounded in Chinese history.

Definitions

Before we explore the question of which weaving technologies exchanged hands, let me first define all weaves as complex, if not woven in the tabby binding structure. This categorization deviates from others in practice, suited to a specific agenda. For example, for her purposes, Anna Muthesius divides Byzantine figured silks into five categories: tabby, damask, twill, lampas, and tapestry weave (1997, 1). In contrast, my demarcation is best suited to understanding the history of weaving in China: women in rural households could weave the tabby but not anything else without difficulty. Everything else was most likely undertaken by weavers in workshops, owned privately or by the state (Sheng 2012; 2013). Thus, by this definition, complex weaves include 1) all weaves woven with one set of warp and weft: twill, satin, gauze, damask, and the tapestry, though its patterning was made freehand and not by mechanical repetition on the loom, 2) weaves woven with one set of warp and weft but with supplementary weft for patterning purposes such as brocading, and 3) weaves woven with more than one set of warp and weft known as compound weaves, including the double-cloth. In early China the complex weaves were always woven in silk, although this was not the case outside of China.

Due to the colorful patterns of the complex weaves, they were usually referred to as “jin” 錦 – pictorially written with a metal radical on the left, *jin* 金 and on the right, the word “bo” 帛 for silk woven in the simplest binding structure of tabby. According to the earliest Chinese dictionary, *Shuowen jiezi* 說文解字 compiled by

Xu Shen (許慎, 58–147 CE) in the second century, *jin* 錦 is simply “patterned silk”: the patterning was presumed colorful (Morohashi 1976, no. 40569). Perhaps the metal radical was used to suggest that the patterning on plain silk was embroidered with a metal needle? Strictly speaking, however, *jin* 錦 was the warp-faced compound tabby, and should not be translated as “brocade” for the following reason:

Brocade is a term in general use without precise denotation. It has been used for any rich figured textile, and even by extension is applied to any textile with a woven pattern, especially one with a pattern in gold or silver. As the meaning is so indefinite, the use of the word as a noun is not recommended. It has a precise meaning when used as a verb and should be used in that form. To brocade is to weave with a brocading weft, which is a supplementary weft introduced into a ground weave. (Burnham 1980, 14)

Ancient Chinese scribes, poets, and even textile artisans might be forgiven for having referred to any colorfully patterned silks as *jin* 錦, just as today’s scholars, writing in English, for their use of “brocade” as a generic designation of early Chinese figured silks. Here, for the need of clarity in discussing any possible transfer of weaving technologies, *jin* 錦 will not refer generically to polychrome-figured silks but specifically to polychrome-figured silks woven with more than one set of warp and weft, or compound weaves. Of the four possible kinds – warp-faced compound tabby (Fig. 8.1), warp-faced compound twill, weft-faced compound tabby (taqueté) (Fig. 8.2), and weft-faced compound twill (samit, samite, or samitum), the Chinese perfected the warp-faced compound tabby long ago.

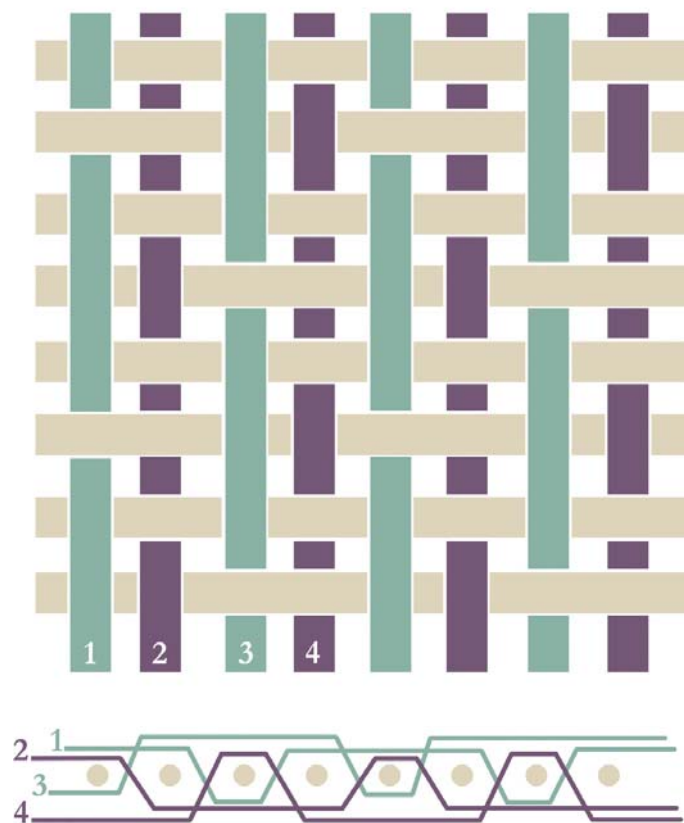


Fig. 8.1: Warp-faced compound tabby (drawing: Sidsel Frisch, after Centre International d’Étude des Textiles Anciens (ed.) 1979, 21, fig. 66). The schematic depictions of weaving structures are meant to serve as visual aids, without referring to a particular textile. The editor chose to collect them all in one chapter for the convenience of the reader: Chap. 8 was chosen because of its technological focus.

Early Chinese warp-faced compound tabby *jin* silks with text

The weave structure of the earliest examples of *jin* 錦, excavated from the Number One Chu Tomb (340–278

BCE) at Mashan, Jiangling of Hubei province in 1982, was revealed through technical analysis as a weave of tabby binding structure with the patterning in compound warp: that is, more than one set of warp ends, either two or three sets, each set a different color. Woven in three colors, shroud N4 features a large pattern unit of angular dancers, dragons, phoenixes, and mythical creatures (W: 50.5 cm; pattern unit 5.5 cm in warp direction and 49.1 cm in weft direction) (Hubeisheng 1985; Kuhn and Zhao 2012, 94–95, figs. 2.33a–c.). The technical term for this structure in Chinese is *jing xianhua jiawei jing erchong pingwen* 經顯花夾緯經二重 translated into English as “warp-faced compound tabby” that, for the sake of simplicity, eliminated the reference to an internal weft (*jiawei* 夾緯) and two sets of warp (*jing erchong* 經二重) in the Chinese term (Wu 2006).

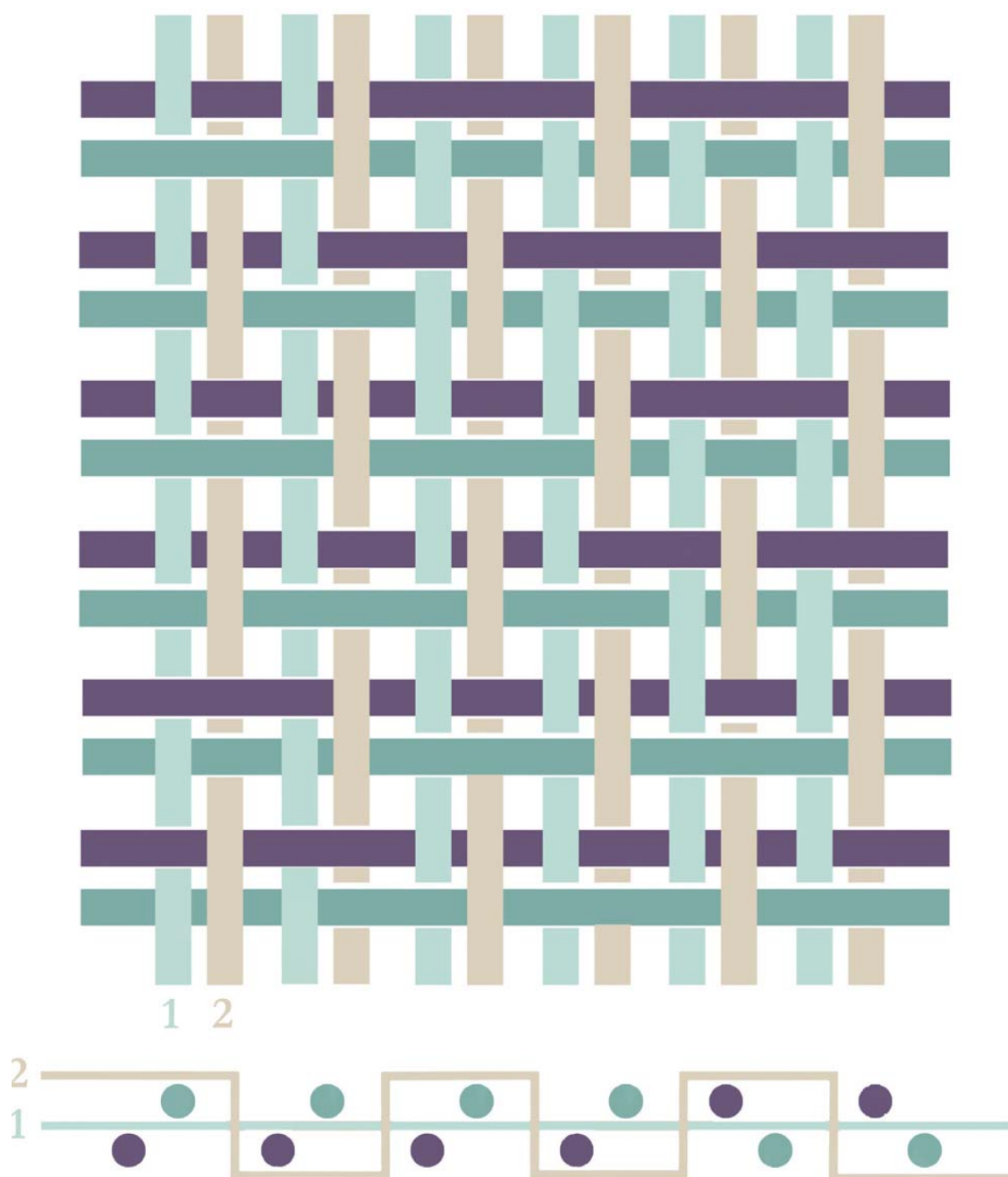


Fig. 8.2: Weft-faced compound tabby (drawing: Sidsel Frisch, after drawing by Prof. Zhao Feng).

In 1972, 10 years prior to the discovery of these Mashan finds, Chinese archaeologists carried on excavations in Mawangdui near the city of Changsha in Hunan province and unearthed the Number One Han Tomb belonging to Lady Dai (wife of a marquis), who died in 168 BCE. Over one hundred items of buried clothing and textiles were unearthed, woven in hemp, ramie, and silk. Of the silks, the weave structures ranged from the simple tabby – plain *juan* 絹 and diaphanous *sha* 紗 – to the complex weaves of monochrome *qi* 綺 (patterned in twill), monochrome simple and patterned gauze *luo* 羅 (with more than two intertwined warps),

and the polychrome, warp-faced compound tabby *jìn* 錦. Of the last category, examples of patterned silks with raised loops, *qirongjìn* 起絨錦, a prototype of velvet, were included.

This last category made a brief appearance, as the Chinese elite in the subsequent Eastern Han dynasty (25–220 CE) preferred *jìn* silks woven with Chinese characters to convey specific wishes. For example, the textile central to Tseng’s paper in this volume, the armguard (warp 12.5 cm × weft 18.5 cm, see Fig. 6.14), bears the Chinese characters *wuxing chu dongfang li zhongguo* 五星出東 方利中国 – “Five planets rising in the east are auspicious for the Middle Kingdom.” It was excavated in 1995 from Tomb M8 at Niya, Minfeng, in the Uyghur Autonomous Region of Xinjiang and dated to the third–fourth centuries CE (Zhao and Yu 2000, cat. no. 24). This armband was one of 37 exquisite textile finds, including a pair of miniature trousers (L: 13.2 cm × W: 7 cm), also woven in the same five colors, and significantly, featuring the woven words *tao Nan Qiang* 討南羌 – “Attack the Southern Qiang” (Li 2012, 124; Fig. 6.3).

Chinese archaeologists argue that the two woven phrases were meant to be read consecutively as “When five stars rise in the East, it is greatly beneficial for the Middle Kingdom to attack the Southern Qiang” because the sentence corresponds to an earlier event recorded in the *History of the Former Han Dynasty*: in 61 BCE Emperor Xuan 宣帝 (reign 74–49 BCE) ordered Zhao Chonguo 趙充国 to conquer the Qiang, who lived in the northwestern frontier of today’s Gansu province, in the southern reach of the Xiongnu’s control. For details, see Tseng’s paper in the current volume.

Such an aggressive attitude in the woven text, however, was not the rule but the exception among other polychrome *jìn* silks woven with words from the same Tomb M8 at Niya found in 1995. Two kinds bordered the wool caftan. The first one read *yannian yishou dayi zisun* 延年益 寿大益子孫 (lit. extended years add to longevity, greatly benefit sons and grandchildren), the same words previously found on mittens and a sock unearthed in 1959 (*Sichou zhi lu* 1973, nos. 4 and 5). The second said *lexiuwen dayi zisun* 樂綉文大益子孫 (lit. happy embroidered patterns greatly benefit sons and grandchildren) (Zhao and Yu 2000, 30–31). Yet another fragment was woven with the words *yannian yishou changbao zisun* 延年益寿長保子孫 (lit. extended years add to longevity, protect sons and grandchildren for a long time), while the words *anle ruyi changshou wuji* 安樂如意長寿无极 (lit. peace and bliss as you wish, long life in the endless realm) were woven on the *jìn*-silk pillow (Zhao and Yu 2000, 32–33). These words express wishes for peace and bliss in life after death and even more importantly, the well-being of future progeny.

Polychrome *jìn* silks woven with texts dated to the same Eastern Han period (25–220 CE) were also found in 1980 from Tomb 2 in nearby Ruoqiang, Loulan, also in the Kingdom of Kroraina. Such words as *xushi* 续世 (lit. continue generations), *guang shan* 广山 (lit. broad mountain) and *shou* 寿 (longevity) were woven into some fragments (Wu 1992, col. pls. 34, 37 and 38).

Similarly worded polychrome *jìn* silks were also unearthed at Noin-Ula in Mongolia, dated to the Eastern Han period as well. They are now housed at the State Hermitage Museum in St Petersburg (Lubo-Lesnichenko 1960).

Farther afield, similarly patterned Chinese *jìn* silks with nearly indiscernible texts were discovered in tombs dated to the third century CE at the Syrian oasis city of Palmyra (Schmidt-Colinet *et al.* 2000). Lothar von Falkenhausen confirmed that the woven words generally expressed wishes for longevity and the maintenance of the family line – consistent with all the above-cited examples. He also traced the woven lattice pattern with the circular ring symbolic of the ritual jade *bi* disc to one painted on a tomb wall at Miaoshan, Tongshan county in Jiangsu province in the Eastern Han period (Falkenhausen 1999, 47).

This design would inspire similar patterns woven in Byzantine Egypt from the sixth century onward, but with slight alterations to satisfy local aesthetic needs. (For examples, see “Ribbon Lattice with Pine Cone” and “Vine Lattice with Birds”, the latter excavated from Panopolis (Akhmim) [Thomas 2012, 150, B and C; Metropolitan Museum of Art 1946.156.13 and 1915.109]; see also Fig. 5.21 in this volume). Back to Palmyra –

as the Palmyran military and merchants moved around to nearby oases, they possibly brought luxurious textiles such as Chinese silks with them, even perhaps to Dura Europos, where exceptional finds were also unearthed (to be discussed below).

Clearly, the woven inscriptions in the *jin* silks reflected Chinese anxieties about life after death and their wish for the well-being of their progeny. That these *jin* silks were found buried with the royal elite of the Kroraina Kingdom revealed the high esteem that the latter held for these textiles and the value they gave them. Possibly they also understood the meaning of the words, as they could have come into contact with the Chinese directly. Whether the buried Kroraina royals were given the *jin* silk woven with the charged words of “attacking the Qiang” as a reward for having participated in one of the Chinese southward conquests remains a hypothesis requiring further research (Yu 2000). All material evidence would suggest, however, that those who received the *jin* silks with woven inscriptions in far-away Noin-Ula or Palmyra probably did not understand them: these words only confirmed that the *jin* silks came from distant China and as such, were rare and precious.

All these *jin* silks were woven in the same warp-faced compound tabby weave structure. Most probably, they were products of state-operated workshops in central China and not in oases around the Taklamakan desert. Yet, evidence suggests that the local people in Niya cultivated mulberry trees, raised silkworms, and produced raw silk. This possibility corresponds with the research conducted by both Zhao and Kenoyer on the origin, type, and transmission of the silkworm along the network of the Silk Road. It would seem more than likely that the raw silk tended to be supplied regionally rather than transported a long distance from the source. However, it would be doubtful that the local inhabitants of Niya wove figured silks in this complex warp-faced compound tabby *jin*, at least not with intricate and curvilinear designs like these silk fragments with Chinese characters. To weave the latter would require some kind of draw mechanism to repeat the pattern mechanically: there is no evidence of such in Niya.

The question then would be what else was transmitted by these *jin* silks, besides motifs like for example the lattice with jade *bi* discs? In other words, did these *jin* silks with their several layers of warp containing the hidden weft inspire weavers in Central Asia and West Asia to imitate the layering in the weft to produce weft-faced compound tabby (taqueté), as some Chinese textile historians seem to claim? This view seems highly improbable as it would be the opinion of someone examining a textile fragment and trying to reconstruct its weave using the kind of loom that he or she is familiar with, not taking into consideration the dramatically different traditional loom systems of other regions and cultures.

Chinese looms

The textile finds at Mashan (340–278 BCE) and Mawangdui (dated to 168 BCE) were woven in state-sponsored workshops. From the latter come silks woven with polychrome patterns of geometric shapes and stylized flora that required more than one set of warps, each set a distinct color so that the warps of unnecessary colors floated on the back of the silk. The weft was hidden underneath the warp floats. The width of the silk averaged around 50 cm, roughly the span between the two frontally outstretched arms and hands of a weaver seated in front of a loom. The density of the weave was about 120–156 warp ends (grouped in 2, 3 and 5 sets or 2, 3, 5 colors) and 40–48 weft picks per square cm (Shanghaishi 1980, 34).

What kind of loom permitted the weaving of such high-density, patterned silks? It could not have been the slanted loom depicted on nine stone slabs unearthed from various parts of northern, central, and southern China. Dated to the Eastern Han (25–220 CE), the second register of one stone slab from Jiangsu (on exhibit in 2009 in Beijing) shows a woman seated at a slanted loom (Fig. 8.3) (Chen 1984, 198–199; Sheng 2012, 16). The motif is a condensed story about the Confucian disciple Zengzi, living in the fifth century BCE, who was

accused of murder while his mother, interrupted at her weaving, defends his honor. The illustration shows a slanted loom with both a warp and cloth beam, the warp threaded through a reed, and two treadles. It is a loom for weaving the simple tabby. While there is no hard evidence for the existence of such a slanted loom in Zengzi's time, it was surely widespread by the first century.

Perplexed, the late John Becker at the Skolen for Brugskunst in Copenhagen (now part of the School of Design, the Royal Danish Academy of Fine Arts), with the help of his assistant, Berthe Forchhammer, made some experiments. After modifying a contemporary horizontal loom, Becker successfully recreated a warp-faced compound tabby *jin* silk of the Han dynasty, with the woven words *yi* 宜 (suitable) and *jin* 錦, in blue and yellow (Becker 1987, 63–65). It replicated the design of a fragment now kept at the National Museum, New Delhi (LC vii.02) that Sir Aurel Stein had discovered in the early twentieth century. More than a decade after Becker's reconstruction, the same silk was found on mittens and a face cover in Tomb M3 at Niya in 1995 (more below). Following this find, Becker reproduced another *jin* silk in three colors – red, olive, and buff – with more curvilinear designs. He even rewove a *jin* silk with raised loops like the one found at Mawangdui (Becker 1987, 66–78).



Fig. 8.3: Slanted loom representation carved on a stone stele, Sihongxian, Jiangsu province, dated to the Eastern Han (25–220 CE) (after Chen Weiji 陳維稷 1984, 198–199, fig. III5-1-2).

These results led Becker to conclude that during the Han dynasty an experienced weaver would have first adapted an artist's sketch to his loom, and then woven it with "... two tabby shafts supplied with clasped heddles [to separate the warps for patterning], and two treadles for weaving the tabby [ground]." Most likely, an assistant would have helped the weaver in lifting pattern heddle rods when necessary, though it would not have been too difficult for a cord over a pulley arranged so that the weaver could manage the raising of the heddle himself. As labor was in ample supply, Becker deemed the use of an assistant or even two as likely (1987, 78). Becker also noted astutely that polychrome silks woven sometime after the Han dynasty (that is, after the third century) showed "a certain dryness and regularity" that indicated some other methods were used to weave the patterns (1987, 78). This last point would tally with the textual evidence that Dieter Kuhn decoded, to which we next turn.

Kuhn has translated a poem of the Han dynasty called "Rhapsody on Women Weavers" (*Jifu fu* 机妇赋) (1995, 97–102). Its author, an erudite scholar named Wang Yi 王逸, was appointed as palace attendant between 126 and 144 CE. Somehow Wang Yi witnessed beautiful women preparing the warp, and after climbing the

magical loom, weaving. Using metaphors and taking some poetic license, Wang Yi described the loom and how it functioned in detail. On a big structure, it had two shafts, three beams (the warp and cloth beams and a back-roller), a reed, a high tower with twin posts (the figure harness), and a revolving pattern axle. Of the latter two devices for making patterns, Kuhn's interpretation is clear:

The drawboy or drawgirl sits high above the warp threads in the figure tower and pulls the strings which finally lift the warp threads forming the pattern previously designed. The up-and-down movement of the harness cords with their attached weights resembles jumping fishes trying to catch and swallow bait ... It is important to note that the revolving patterning axle was used as a sort of pulley to facilitate the lifting work. The lifting of the warp threads was done by the drawboy or girl who pulled the strings. When that happened the lifted warp threads and the harness-cords stretched tightly. As soon as the warp threads went back into their ground position the cords were no longer tight but hung loose. (Kuhn 1995, 101–102)

Kuhn provides a drawing based on the 1264 text, *Ziren yizhi* 梓人遗制 (carpenter's manual) (Kuhn and Zhao 2012, 61). It could have resulted from a combination of the treadle-operated loom and a kind of pattern-rod loom (Kuhn 1995, 102).

Yet another kind of loom existed for making patterned weaves. In the often cited text *Xijing za ji* 西京雜記 (Miscellaneous Records of the Western Capital), attributed to Liu Xin 劉歆 of Han times but more likely written by Wu Jun 吳均 of the Liang 梁 state in the sixth century, it was recorded that during Han Emperor Xuan's reign (73–48 BCE), the wife of a rich merchant named Chen Baoguang 陈宝光 wove 25 bolts of patterned silks using a loom equipped with 120 *nie* 攝 (treadles) for patterning purposes (Chen 1984, 204). The silks were called *sanhua ling* 散花綾: a twill with a scattered pattern (of binding dots). Without an actual extant and corresponding textile in this pattern, it would be impossible to know whether it was a silk tabby patterned in twill (*qi* 綺) or true twill in silk, *ling* 綾. Since the word *ling* did not appear in texts until after the Han dynasty, it would be safer to imagine such a loom operating later rather than earlier in time.

An analysis of the “loom with a treadle design of stepping stones” (*dingqiao zhiji* 丁桥织机), a loom with perhaps 20 treadles still in use in the province of Sichuan today, reveals how as many as 120 treadles might have worked (Kuhn 1995, 90–93). Some old weavers recall using as many as 72 treadles to weave the above-mentioned *sanhua ling*, silk twills with a scattered pattern (Chen 1984, 206; Kuhn 1995, 92, fig. 8) (here, Fig. 8.4). This version probably derived from an earlier one that had already adapted the invention of Ma Jun 马均 during the Jin 晋 dynasty (263–420). According to Fei Song's 裴松 record in the *History of Three Kingdoms*, Ma Jun, an impoverished scholar, was intrigued by the cumbersome 120 treadles and sought to simplify the system of controlling the warp ends (Chen 1984, 204). Of interest to note is that Ma Jun lived in Fufeng 扶风 county (today's Xingping 兴平) in the Shaanxi 陕西 province in northwestern China, close to the gateway to the Silk Road network routes west.

Whether due to Ma Jun's invention or not, the technology for controlling the individual warps for purposes of patterning improved over time. Back in the fourth century BCE the Chinese first wove *jin* silks with small, geometric shapes. This would suggest that the weaver could control only a limited number of warps at a time on the available loom. By the second and third centuries CE, Chinese weavers wove far more curvilinear designs such as the more realistic quadrupeds and inscriptions of Chinese characters on the *jin* silk of “Five-Planets-Arising-in-the-East” fame. Clearly, professional weavers now used a loom so equipped as to allow them to control far more warps than previously, resulting in silks that repeated intricate designs with finer curves. To achieve a smooth curve, a very high number of warps and wefts were necessary and needed to be individually controlled. Most probably, these looms were horizontal, equipped with a figure harness towering over the horizontal plane (of warps) and additional pattern rods or treadles (for new finds see epilogue).

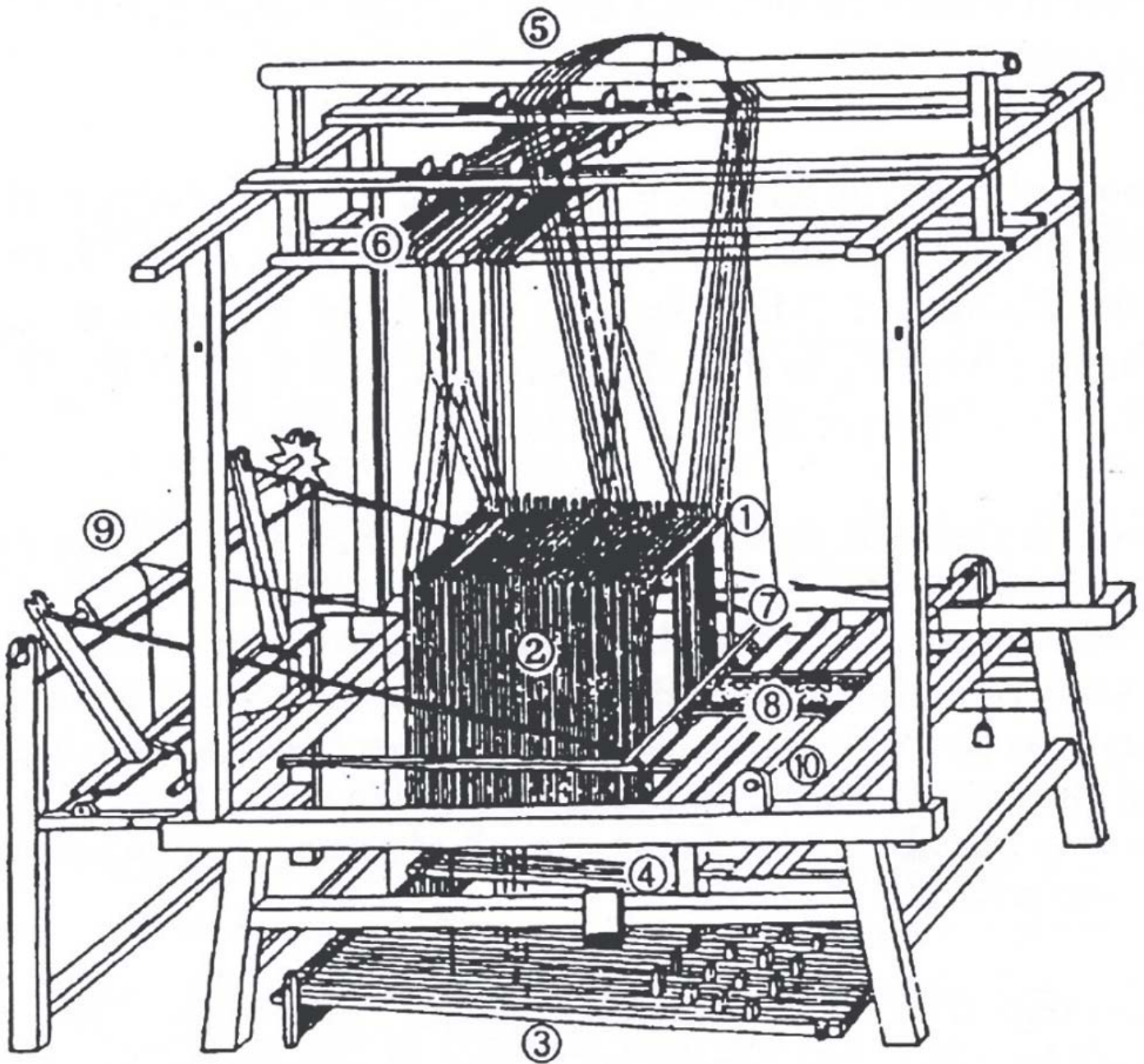


Fig. 8.4: Illustration of “loom with a treadle design of stepping stones” (*dingqiao zhiji* 丁桥织机) 1) depressing shafts (healds) (*suzong*), 2) lifting shafts (healds) (*huazong*) for patterning, 3) treadles (*dingqiao*), 4) auxiliary treadles (*hengqiao*), 5) elastic bamboo bows (*gongpeng*), 6) shafty lifting device (*mudiao*), 7) reed (*sheng*), 8) woven fabric, 9) warp-beam (*jingzhou*), 10) cloth-beam (*buzhou*) (after Kuhn 1990, 91, fig. 45, used by kind permission of Prof. Kuhn).

Let us now briefly review the evolution of looms around the Mediterranean.

Loom technologies around the Mediterranean

As early as the second millennium BCE, weavers in dynastic Egypt and pastoral nomads used a horizontal ground loom. In contrast, weavers north of the Mediterranean used a vertical warp-weighted loom. By the late fifteenth century BCE, a wall painting in Thutnofer's tomb 104 at Thebes shows vertical two-beam looms: instead of the warp being stretched horizontally, the warp ends were now positioned vertically and wound onto a beam close to the ground. This innovation, according to E. J. W. Barber, occurred in the middle of the 3rd millennium in Syria (1991, 114, fig. 3.29 and 213). However, not until somewhere around the first century CE was the vertical two-beam loom introduced to the Greco-Roman world (Wild 2008, 471).

A variation evolved into the “Persian *zilu* loom” still in use today at Meybod in Yazd province, Iran (Thompson and Granger-Taylor 1995–1996) (Fig. 8.5).¹ The *zilu* refers to a coarse, large floor covering, usually of cotton in two colors, woven in the weft-faced compound tabby or taqueté. Jon Thompson and Hero Granger-Taylor believe that this kind of loom was the pattern loom used in the West in the Roman period for weaving figured textiles (both silk and other coarser fibers), one which then remained in use during the subsequent Byzantine period. They cite textual references for the widespread use of the *zilu* loom in the tenth century within the Iranian cultural sphere. For this reason, the *zilu* loom merits a close look.

Thanks to the geographic insularity of Meybod, weavers were still following an ancient practice when Thompson traveled there in 1983, 1984 and 1992 to document the loom and its function. There, workshops are housed typically in barrel-vaulted mud-brick buildings with opening to the street. Inside, two two-beam vertical looms lean against each other, with the vertical beams sunk up to 2 m below the street level to provide the extra height of the finished textile. Also sunk in the trench below street level, the cloth beam can roll up to 10 m of the finished textile. Men weave standing up, walking back and forth along the width of the textile. A weaver usually has an assistant, a young man, who works at the back of the loom, to help beat in the weft.

Unlike the Chinese horizontal loom with a figure harness tower where the assistant sits, the *zilu* loom allows both the weaver and his assistant to work standing and moving on either side of the warp. I will return to this significant point further below.

The *zilu* loom weaver changes the shed for the ground weave of tabby by moving the two bows that pass behind the fixed horizontal stick (parallel to the two shafts: two horizontal sticks suspended from the warp beam above) that is attached to the wall. Due to the width of the loom, the weaver changes one bow at one side, then walks to the other side of the loom to change the other bow. As the two bows are attached to the two shafts, when the bow moves, one shed is open and the weft can be shuttled through and beaten in.

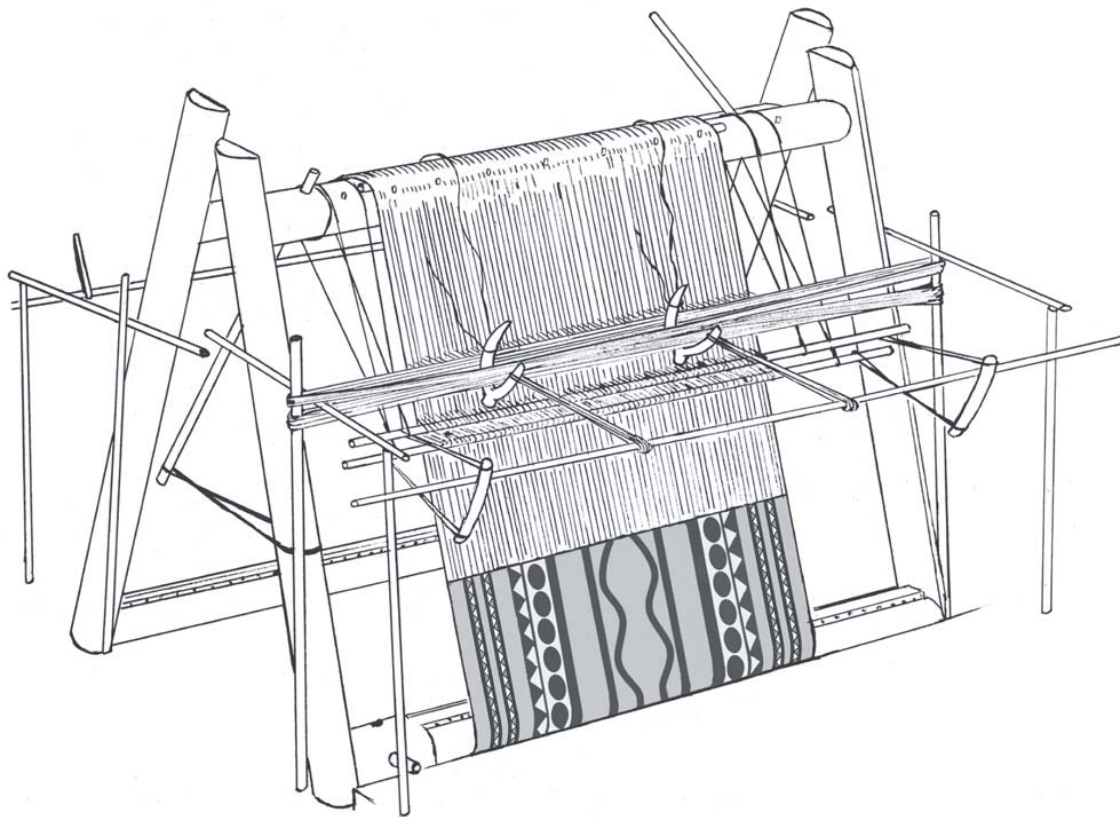


Fig. 8.5: Diagram showing a *zilu* loom at Meybod, Yazd province, Iran, c. 1984 (drawing: Sidsel Frisch, after Thompson and Granger-Taylor 1995–1996, 31, fig. 2).

At this point, the weaver relies on his memory and visual and tactile coordination to pull the necessary pattern cords for this shed toward him. The pattern cords are the transverse cords across the width of the loom,

thick cotton yarn about 1 cm in diameter, wound around two vertical sticks, one behind each upright beam of the loom. The set-up of these transverse cords constitutes the distinguishing feature of this loom: the harness. Individual warp ends are tied to these transverse pattern cords with thick cotton strings (pattern leashes) so that when the weaver pulls one pattern cord, he is picking up those warp ends tied to that cord. He then hooks the selected cords onto the “selection hook” made of mulberry wood to keep the selected warp ends in place. Unlike weavers weaving on looms with figure harnesses further elaborated with “simple cords” or “lashes” that mechanically control the selection of the pattern cords, the weaver using the *zilu* loom must memorize the order in which to select the cords according to the desired pattern (or design).

It would appear entirely possible that the first weft-faced compound tabby was woven on a loom similar to the *zilu* loom.

Weft-faced compound tabby (taqueté) in silk

Just to remind the reader, weft-faced means that the weft dominates on the finished side of the textile and usually the weft covers the warp underneath (and warp-faced, vice versa; see Figs. 8.1 and 8.2). Both the warp-faced and weft-faced plain weaves appeared already in Egypt in the later 18th Dynasty (c. 1550–1292 BCE). The earliest example of the weft-faced weave is the tapestry-woven designs in color on a plain linen found in the tomb of Thutmose IV, dated to the early fifteenth century BCE (Barber 1991, col. pl. 1). Becker agrees with Flanagan that tapestry weavers invented the weft-faced compound weaves (1987, 83). Any direct relationship remains elusive, though it is noteworthy that the tapestry was woven on a vertical loom.

In 1933 the Franco-American excavation at Dura Europos (today’s Salhiyah in Syria) unearthed an exceptional silk fragment woven in the weft-faced compound tabby (taqueté), with rows of simple but fine lines of horizontal trident-like motifs in two colors (Pfister and Bellinger 1945 as cited in Becker 1987, 90). It is now on exhibit in a climate-controlled room dedicated to displaying finds from Dura Europos in the newly renovated Yale Art Gallery (no. 1933.486; here: Fig. 5.2). The Seleucids founded this important site of Dura on the east-west trade route along the Euphrates River in 303 BCE. In 165 CE the Romans captured it but after the Sasanian King Shapur I besieged it in 256–257, it was abandoned (Hopkins 1979). Thus, this fragment has an end date of the mid-third century.

It was woven in silk, heavily Z-spun, and considered not Chinese (usually having little or no twist or S-twist, as the silk was reeled directly off the cocoon). Its density was 24 warp ends and 64 weft picks per square cm. After experimentation, Becker reproduced the same pattern as seen in this fragment. Instead of using a vertical loom like the *zilu* loom, he used a horizontal loom with seven shafts: two for the binding in tabby and five for the main warp, and 12 treadles for the tabby and for making the patterns. He doubted that so many treadles would have been used back in the mid-third century. He concluded that pattern heddles were used in early times to achieve the patterning (Becker 1987, 90–94).

One century or so later, the weft-faced compound tabby was woven in silk much farther east of Dura Europos. Such a fragment was unearthed from the tomb of Dagounu (lit. big-dog-woman) in Huahai, Gansu province, dated to 377 (Matbabaev and Zhao 2010, 88, fig. 4-20) (Fig. 8.6). Technical analysis of the fiber reveals that the silk used to weave this Dagounu fragment came from wild cocoons, different from the domesticated variety used in inner China. Based on this evidence, Zhao considers it likely to have been woven locally in Kucha, Shule or Gaochang (ancient Turfan) or in the Ferghana valley in Central Asia (Matbabaev and Zhao 2010, 90). His judgment resonates with Good’s earlier discovery of and discussion on wild silk in use outside China before the first millennium (Good 1995). A comparable piece with simplified dragon motifs was found as trim on a cotton caftan at Yingpan (99BYM8: 21), dated also to the late fourth century (Fig. 8.7). Zhao estimates this piece as evidence of local imitation of Chinese warp-faced compound tabby *jin* silks of

dragons and clouds in both structure and design (Zhao 2002, 59).

While the weavers might have imitated the Chinese in the design of the motifs, it is just as likely that they followed their own tradition of weaving on a vertical loom. Excavated documents from Turfan show that even much later in the sixth century, local weavers were still weaving on vertical looms. The telltale signs were the dimensions of the reported textile, about 2.3 m high and 1.1 m wide, as well as their measure word, in “sheets” (*zhang* 張) as opposed to “bolts” (*pi* 匹, about 12 m in length) (Sheng 1999, 135).



Fig. 8.6: Silk fragment in *weft-faced compound tabby (taqueté)*, excavated from the tomb of Dagounu (lit. *big-dog-woman*) in Huahai of Gansu, dated 377 CE (after Matbabaev and Zhao 2010, 88 and fig. 4-20, photo used by kind permission of Prof. Zhao Feng).

Possibly, however, the locals were learning to weave the Chinese *warp-faced compound tabby* on a Chinese horizontal loom? A far simpler design of checks only, in blue and yellow plus two rows/columns in rust and green, was woven in the *warp-faced compound tabby*, also in silk, found in 1995 as a robe (M3:40) that dressed the male buried with a female in Tomb M3 in Niya (near Tomb M8 of the “Five-Planets” armguard). The selvedge-to-selvedge width of the checkered silk was 42 cm. The density of warp and weft count per square cm was relatively high on the checkered silk at 100 warp ends and 30 weft picks per square cm.

The dead man’s face was covered with a silk woven in the *warp-faced compound tabby* on a blue ground contrasting in yellow: angular waves, dots, and Chinese characters expressing good wishes for coming generations: *shi fu[wu?] ji jin yi er qin chuan zisun* 世母极锦益二亲传子孙 (lit. *generation-not-extreme- jin silk benefit two families – pass onto sons and grandchildren*) (Zhao and Yu 2000, 64 and 75, M3: 25). In addition, he had silk mittens on his hands with an identical design (M3: 51). The selvedge-to-selvedge width

was 44 cm. The density count per square cm was 120 warp ends and 32 weft picks.

The dead woman's face was also covered with silk, but in contrast to the male's silk, patterned with angular waves and dots, this one was of the Chinese variety in warp-faced compound tabby with complex designs of clouds, quadrupeds, and Chinese characters (M3: 26). With a selvedge-to-selvedge width of 45.3 cm, its density was 168 cm warp ends and 22 weft picks per square cm.



Fig. 8.7: Silk fragment with simplified dragon motifs (99BYM8: 21), excavated in 1999 from Yingpan, dated to the late fourth century (after Zhao 2002, 58–59, cat. no. 19. Photo: by kind permission of Prof. Zhao Feng. © Xinjiang Uyghur Autonomous Region Museum Collection; by kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).

The couple shared a cover (M3:24), sewn from two pieces of *jin* silk (with selvedges intact), with the auspicious Chinese words *wang hou hehun qianqiu wandai yi zisun* 王侯合昏千秋万代宜子孙 (lit. the king-marquis marriage [for] a thousand autumns and ten thousand generations [will] benefit their progeny). Chinese archaeologists have surmised that this was a wedding gift woven in central China and sent to the

deceased, a royal couple, at the time of their marriage (Zhao and Yu 2000, 73). The five-colored, warp-faced compound tabby had a density of 160 warp ends and 24 weft picks per square cm.

The much higher count of warp ends – 168 on the female’s face-cover and 160 on the shared bed-cover – as compared with that on the checkered silk at 100 and that of the male’s face cover and mitts at 120 would correspond to the more complex designs. The more curvilinear the motif, the more warp ends required for a finer resolution of the outline.

Weft-faced compound tabby (taqueté) in wool

If local weavers in oases around the Taklamakan Desert were indeed learning how to weave the Chinese specialty of warp-faced compound tabby, they were either already skilled in weaving weft-faced wools or had access to them, or both. Rare examples of the weft-faced compound tabby (taqueté), woven in *wool*, were also discovered in the environs of Niya and Yingpan. For example, from Niya, a wool fragment with blue geometric designs on buff ground interspersed with red, dated to the third or fourth century (L: 53 cm × W: 48 cm) (94MNN2: 1) (Zhao 2002, 38) is seen below (Fig. 8.8).

Wool fragments woven in taqueté from Yingpan differ in the complexity of the motifs, ranging from the simpler geometric to the more difficult curvilinear shapes. For example, the shape of the tree pattern (inv. no. C27) (Fig. 8.9) is simpler than the stylized four-petaled flowers on another (89M7: 9) (Li 2006, 247–253, figs. 193 and 194) (Fig. 8.10). The same four-petaled motif is also woven into another fragment (99BYYM18: 19) (Zhao 2002, 50) (Fig. 8.11). Yet another is patterned with stylized buds on stripes (M15: 3-3) (Li 2006, 252, fig. 195) (Fig. 8.12). The most intricate and difficult to weave would be the more curvilinear “scrolls and blossoming tree motifs” on a fragment from tomb M15, dated to 420 (M15: 3-2) — the motifs showing strong Greco-Roman influence (Li 2006, 251, fig. 192) (Fig. 8.13). The other fragments are dated approximately from the second to the fifth century. Who wove these woolen fragments and where?



Fig. 8.8: Wool fragment woven in weft-faced compound tabby (taqueté) (94MNN2:1), excavated in 1994 from Niya; L: 53 × W: 48 cm (after Zhao 2002, 38, cat. no. 9. Photo: by kind permission of Prof. Zhao Feng. © Xinjiang Uyghur Autonomous Region Museum Collection; by kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).

Conclusion: the role of the double-cloth?

A fine woolen fragment in green and yellow discovered in Tomb 2 of Shanpula in 1984 (L: 11.5 × W: 6.8 cm) might provide a hint to the transmission of using compound tabby in weaving (Wu 1992, 86; Xinjiang 2001,

172, fig. 328) (Fig. 8.14). Dated to the Western Han (206 BCE–8 CE), it features a grape leaf and the bottom of a bunch of grapes. This fragment was woven in the double-cloth, a weave structure that requires two sets of warp and weft, one each to be woven in the tabby (hence the “cloth” part of the name) but the two layers of the tabby are bound together along both selvages so that the two layers act like an envelope (Fig. 8.15). In other words, the weaver of this fragment had arranged two sets of warp on the loom to be woven with two sets of weft so that one set each of warp and weft was bound in the tabby structure (cloth). In short, weavers of double-cloth had access to the techniques of weaving both warp-faced and weft-faced compound tabby!

Given its wool fiber and the grape motif, the fragment, though broadly dated to Western Han, was most likely woven by some weaver living to the west of China, since professional weavers in China wove complex weaves only in silk and almost never used the grape motif. The question, then, is how far west? In 1995 another example of double-cloth in wool came to light from Tomb M15 at Yingpan (M15:3) (Li 2006, 248, fig. 186) (Fig. 8.16). It was a red-and-yellow woolen caftan worn by a young merchant 190 cm tall, with a lower end date of 420 CE, though of course it could have been woven much earlier and preserved over time for a later burial. The repeated pattern consisted of two alternating rows: in one, paired quadrupeds such as a bull and a horned ram or ibex facing each other in body but with their heads turned backward, while in the other, naked men with curly hair wearing a cape or scarf (of Sasanian origin), likened to *putti* of Greco-Roman origin, brandishing various weaponry in slightly different stances. Both rows were placed amidst pomegranate trees.



Fig. 8.9: Wool fragment with geometric tree pattern (inv. no. C 27) woven in warp-faced compound tabby (taqueté) from Yingpan, second–fifth century (after Li Wenying 2006, 251, fig. 193. © Xinjiang Uyghur Autonomous Region Museum Collection; by kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).

This stunning design has already merited considerable scholarship (Bunker 2004). While the design of the *putti*-like figures originated in the Mediterranean coasts of Late Antiquity (third–seventh centuries), the motif of the pomegranate and paired animals came from Persia. Its density – 2 pairs of 14–16 warp ends and 2 pairs of 44 wefts per square cm – is higher than that found on the woolen taqueté fragment with “scrolls and blossoming tree motif” (M15: 3-2, Fig. 8.13 above) sewn to the left panel of the caftan. The taqueté fragment had a density of 2 pairs of 13 warp ends and 2 pairs of 34 weft picks per square cm (Li 2006, 247 and 251). Thus it would seem most probable that the red-and-yellow woolen double-cloth sewn into the caftan was woven somewhere in West Asia, at an urban center with specialized weaving workshops. There, skilled and innovative weavers could experiment on a complex drawloom (or one prototype) with some certainty regarding both resources and permanence of the loom set-up.



Fig. 8.10: Wool fragment with geometric four-petaled flowers (89M7: 9) woven in warp-faced compound tabby (taqueté) from Yingpan, second–fifth century (after Li 2006, 252, fig. 194. © Xinjiang Uyghur Autonomous Region Museum Collection; by kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).

I would like to propose that it is more than likely that the weavers wove the double-cloth on a loom similar to today's *zilu* loom. We now return to the salient point about the *zilu* loom: both the weaver and the assistant work standing and walking back and forth along the width of the loom on either side of the warp. As the weaving progresses, they can easily check the identical images (but in opposite colors) on the obverse and reverse side – something that would be difficult to do for the Chinese weaver seated at a horizontal loom near the cloth beam and the drawboy or drawgirl sitting at the top of the figure harness.

Nor would the Chinese be interested in weaving a large textile in double-cloth. Culturally, the ancient Chinese painted walls and used reed mats to define a seating area; they did not hang tapestries. In contrast, pastoral nomads used textile furnishings to soften and warm their living environment. For example, those nomads from Pazyryk on the Altai foothills imported a large wool pile carpet from Persia (based on the dye analysis, Polosmak and Barkova 2005). It had been frozen in barrow 5 from the fifth–fourth centuries BCE until excavation and is now kept at the State Hermitage Museum in St Petersburg (Rudenko 1970, pl. 174). Measuring 183 cm high and 200 cm wide, this famous carpet features concentric squares of designs within designs, from outside in: men on horses march anti-clockwise in an outer border around a border of stylized flora around antlered deer roaming clockwise around the central field. Although it is unclear whether the Pazyryk carpet were hung or spread on the ground, the use of the carpet as decoration could be related to wall and floor decorations in mosaics in the extensive Greco-Roman world until the fifth century CE. A double-cloth with visible design on either side could be useful and appealing as a mobile spatial divider – a

question that begs for more research.



Fig. 8.11: Wool fragment with geometric four-petaled flowers (99BYYM18: 19) woven in warp-faced compound tabby (taqueté) from Yingpan, second–fifth century, L: 72 × W: 32 cm (after Zhao 2002, 50, cat. no. 15. Photo used by kind permission of Prof. Zhao Feng © Xinjiang Uyghur Autonomous Region Museum Collection; by kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).

Chronologically, the weaving of the double-cloth in wool came first, as in the fragment with grape design dated to the first (or possibly the second) century, and probably woven somewhere in Central or even West Asia under the Greco-Roman and Persian influence. The use of double sets of warp and weft would then lead to experimenting in weaving the weft-faced compound tabby in a silk-weaving center, perhaps Palmyra or some other major city on the eastern Mediterranean, as in the Dura Europos silk taqueté. This technique was then transmitted eastward: for example, the Dagounu fragment dated to 377 CE, woven in an oasis around the Taklamakan Desert. Just as the Dagounu fragment was woven with spun wild silk, weavers used spun silk in Central Asia as well, but at a later date. In 1988 archaeologists found thirteen fragments of taqueté in spun silk from seven tombs at Munchaktepa, dated possibly to the fifth-sixth centuries (Matbabaev and Zhao 2010, 88–90 and 257–258). The designs appear rather crude, suggesting the introduction of a new technique. It remains unclear whether the weavers of these fragments learned from weavers living to their west, north, or east.

The significance of the taqueté weaving for early Chinese weavers meant that they found new techniques to make pattern repeats in the weft, in addition to what they already perfected in making pattern repeats in the warp. This possibility would lead to weaving the warp-faced compound twill (taqueté) and the weft-faced compound twill (*samitum*), the most complex of all compound weaves, in the seventh century (Sheng 1999). However, knowing *how* to do so did not mean that they were necessarily interested in *doing* so. Instead, the Chinese went on to develop the satin weave, prized for its glossy surface achieved due to the long warp floats. A prototype was woven in the late tenth century, discovered at the ruins of the Sengim temple near Turfan (Wu 1992, 131 and col. pl. 98). With repeated patterns of flying phoenixes and butterflies around stylized floral

roundels, this figured silk was used to make a bag for storing *sarira* – Buddhist sacred relics.

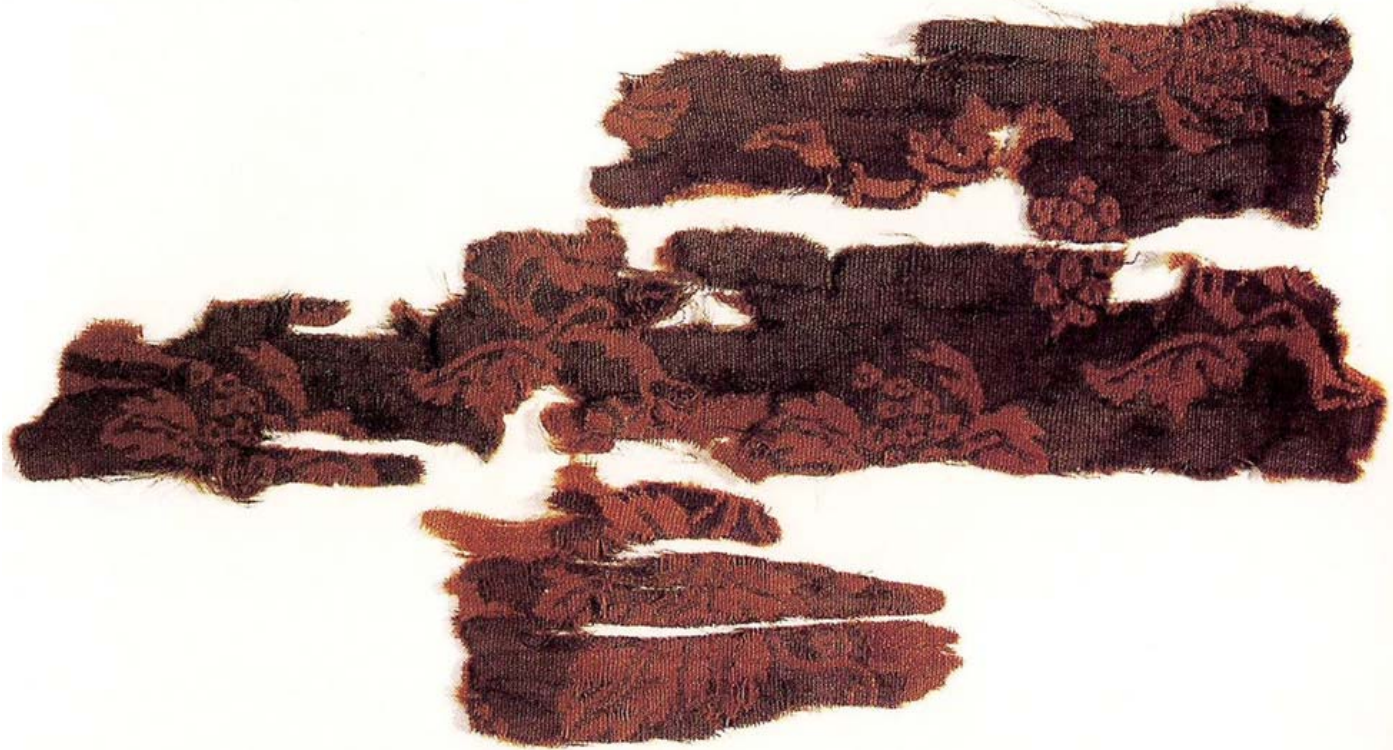


Fig. 8.12: Wool fragment with stylized buds on stripes (M15: 3-3) woven in warp-faced compound tabby (taqueté) from Yingpan, second–fifth century (after Li 2006, 252, fig. 195. © Xinjiang Uyghur Autonomous Region Museum Collection; photo kindly provided by the Abegg Foundation; used by kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).



Fig. 8.13: Wool fragment with more curvilinear scrolls and blossoms (M15: 3-2) woven in warp-faced compound tabby (taqueté) from Yingpan, second–fifth century (after Li 2006, 251, fig. 192. © Xinjiang Uyghur Autonomous Region Museum Collection; by kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).

Simultaneously, after the fall of the Roman Empire in the late fifth century CE, Byzantine weavers around the Mediterranean continued to weave the *samitum*. Eventually it led to the weaving of the *lampas* from the tenth century onward.



328 绿地棕、黄葡萄纹罽 (84LS I M01 : 369)
Woollen cloth with grapes design(84LS I M01 : 369)

Fig. 8.14: Wool fragment in yellow and green with grape motifs, woven in double-cloth, excavated in 1984 from Tomb 2 at Shanpula, dated to the Western Han (206 BCE–8 CE), L: 11.5 × W: 6.8 cm (after Zhongguo Xinjiang Shanpula 2001, 173, pl. 328. © Xinjiang Uyghur Autonomous Region Museum Collection; by kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).

The Chinese and the Eastern Mediterranean loom systems differed totally. Weavers in each of these cultural spheres invented ways of organizing and controlling the warp and weft for mechanically repeating patterns in their own ways, at least until the tenth century. However, they did absorb new motifs from other cultures, of which only one example of many was alluded to here, that of the lattice with the circular disc.

Epilogue

In this paper I propose the possibility of sophisticated weavers weaving the double-cloth on a vertical loom somewhere in Central or West Asia perhaps as early as the first or second century and that the weaving of the double-cloth led to the weaving of the weft-faced compound tabby on a vertical loom. After I submitted the revisions of this paper in December 2013, a Norwegian weaver contacted me by chance in January 2014 with regard to the weaving of the samitum. By June, Åse Eriksen was weaving the samitum or the weft-faced compound twill on a vertical loom. Her process can be viewed on youtube: https://www.youtube.com/watch?v=YeFN_ScLUFU

If the most complex samitum can be woven on the vertical loom, so, too, can the double-cloth, the simplest of the compound weaves. I am most grateful for Åse's contribution, a synchronistic and experimental research result.² Furthermore, in 2013, Chinese archaeologists unearthed loom parts dated to the second century BCE from Laoguanshan (near Chengdu). Based on this find, a team of specialists led by the China National Silk Museum have just reconstructed two models of pattern looms (Zhao Feng et al. 2016).

Acknowledgements

My thanks go to Dr Hildebrandt for her invitation and to the Volkswagen Foundation for the funding that allowed me to participate. I would also like to thank Prof. Zhao for sending me his new publications on recent finds.

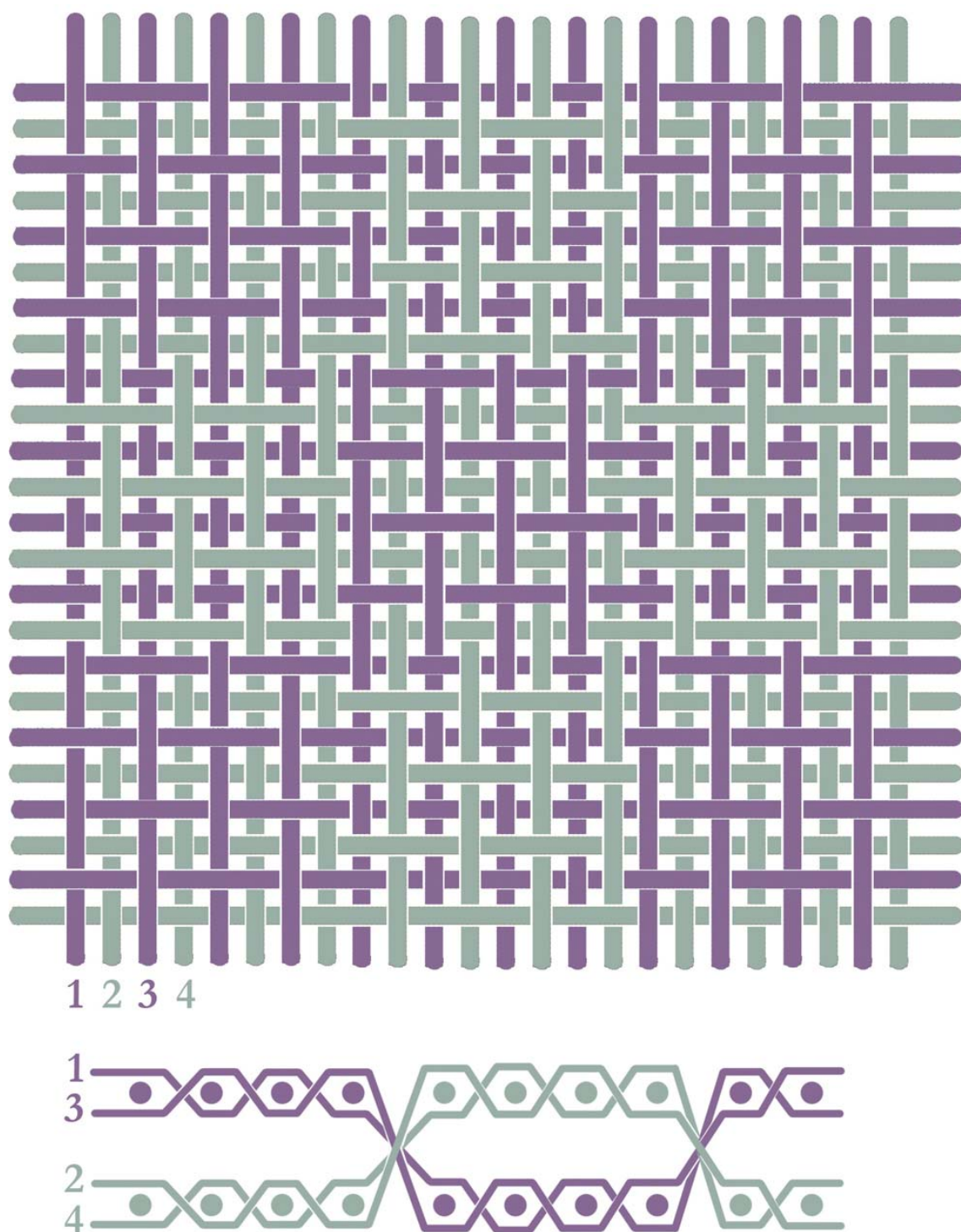


Fig. 8.15: Double cloth (drawing: Sidsel Frisch, after Centre International d' Étude des Textiles Anciens (ed.) 1979, 25, fig. 76 and Becker 2009, 224, fig. 167).



Fig. 8.16: Woolen double-cloth in red and yellow (M15: 3), used to make the caftan worn by the deceased, excavated from Tomb M15 at Yingpan (after Li 2006, 248, fig. 186. © Xinjiang Uyghur Autonomous Region Museum Collection; by kind permission of the Director of the Xinjiang Museum, Prof. Hou Shixin).

Notes

- 1 We are indebted to Hero Granger-Taylor and Jon Thompson, authors of the paper which provided the source of our modified drawing of the *zilu* loom. Of course the *zilu* loom is more complex than our simplified drawing can show. In a personal communication to Dr Hildebrandt on December 3, 2014, with regard to the modifications, Dr

Thompson stressed the importance of the large wooden hooks for holding back the selected cross-cords in order to make the pattern shed; he also correctly pointed out that the “raising” of the selected cross-cords by means of the hooks is not shown in the drawing, that it is difficult to see from the drawing the heddles attached to the cross-cords as they act on the warp, and that the woven pattern as drawn does not correspond to actual woven patterns. I am grateful for his points. I am even more grateful to Ms. Sidsel Frisch for rendering the loom and pattern as clearly as possible in a two-dimensional drawing. The pattern is merely to illustrate the loom and by no means replicates any original one woven in the 1980s or in antiquity.

Furthermore, I am pleased that Zhao Feng is in agreement with the possibility that a vertical loom like the *zilu* loom was likely the kind of loom used to weave the taqueté or the weft-faced compound tabby in Central Asia in the mid-first millennium (Zhao 2014, 49–64, esp. 60–61).

2 Inquiries about her work can be addressed to her directly: for contact information, please see <http://aasee.tumblr.com/profil>

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Dr. Irene Lee Good (April 24 1958–February 3 2013). An appreciation

Robert E. Murowchick, Angela Sheng and Kaoru Ueda

Dr. Irene Good, who died at age 54 on February 3, 2013, after a long and courageous battle with cancer, was a pioneer scholar in the study of ancient and traditional textiles. Focusing her research primarily on central and southwestern Asia and the Indo-Iranian borderlands, she successfully combined archaeological science with her extensive experience as a weaver to explore a wide range of issues, from the historical development of the technology of weaving to the diverse material and symbolic roles of cloth in different societies to shed light on cross-cultural contact, trade, and visual communication.

Born in Orinda, California in 1958, Irene's passion for archaeology began as a child, leading to her participation in a wide range of archaeological field projects even before completing university. These included the American Revolutionary War site of Fort Griswold (Groton, Connecticut); several historical houses in Southold, Long Island (New York); the Cahokia Mounds (Illinois); Montserrat (British West Indies); and a number of historical sites and burial grounds in the greater Boston area. Her professional journey allowed her to approach the study of archaeology from a number of different directions and perspectives. After successfully completing a B.A. degree in Archaeology (1985) and M.A. in Environmental Archaeology (1986) at Boston University, she served as trench supervisor for the University of Pennsylvania's Gordion Expedition in Turkey, and as site supervisor at the Beib site for the Royal Ontario Museum's Zabid Expedition in Yemen. During this period, her expertise in palynology and her talents in scanning electron microscopy made her a highly sought-after research consultant in many other projects, including Boston University's Stobi Project (Macedonia) and 'Ain Dara Project (Syria), and the Oriental Institute's Quseir Al-Qadim Project (Egypt), among many others. She re-engineered her career path at the University of Pennsylvania, earning a second M.A. (1995) and Ph.D. (1999) in Anthropology. Under the direction of Prof. Gregory Possehl, her doctoral dissertation, *The Ecology of Exchange: Textiles from Shahr-i Sokhta, Eastern Iran*, presented a comprehensive analysis of fibers from this site between the late fourth and early second millennia BCE, and represents a pioneering work in the study of archaeological textiles.



Irene Good working at the Peabody Museum, Harvard (photo: Jon Chase, Harvard Staff Photographer, copyright © President and Fellows of Harvard College)

Irene's research interests concern cloth in all its aspects: from raw material availability, issues of production, labor and organization, and the development and diffusion of technology and materials, to the social and symbolic uses of cloth as a major component of most cultures. She approached the study of textiles from a number of vantage points. Through a paleoenvironmental perspective she examined aspects of local production vs. importation of exotic materials, as well as fiber and dye availability and use. She developed effective methods of sample preparation and microscopic examination to better understand textile fiber

structures, the amino acids of principal silk proteins, and even silkworm species identification through the morphological characteristics of fibroin (an insoluble protein that is a key component of raw silk). In many cases, carefully following biochemical protocols allowed her to identify even very poorly preserved fragments of textile. These meticulous physical studies further informed her investigation of the material and symbolic value and other roles served by textiles in societies past and present. These studies caused her to challenge many pre-conceived notions of East-West cultural interaction and long-distance trade, much to the benefit of scholars in diverse fields of research.



Irene Good working on carpets (photo: Deirdre Windsor, copyright © Windsor Conservation).

Irene's expertise in textile analysis and conservation was eagerly sought by a number of major international collaborative archaeological projects, including the University of Pennsylvania's *Silk Project* and *Tarim Basin Mummies Project*; Sweetbriar College's *Kazak-American Talgar Archaeology Project*, and the

Istituto Italiano per l’Africa e l’Oriente’s *Shahr-i Sokhta Textiles Project*. She also undertook curatorial studies of major museum textile collections, including the extensive collection of Andean textiles in Harvard’s Peabody Museum of Archaeology and Ethnology, where she held a Hrdy Visiting Curatorship in 2001–2002. Having worked on innumerable fragments of ancient textiles from archaeological contexts, Irene took particular pleasure in working on later, more intact textile collections. When analyzing the Peruvian materials from the Peabody Museum, she remarked in an interview with Ken Gewertz of the *Harvard Gazette* that “... working with a whole garment is a real treat for me. I’m used to looking at tiny pieces and holding my breath so they don’t disintegrate.”



Irene Good collecting wool samples from a Soay breed ewe at the Seven Sisters Sheep Centre in Sussex, assisted by Mr. Terry Wigmore, Centre Director (photo by Peter Ditchfield, used by kind permission).

In addition to the Hrdy Visiting Curatorship, Irene’s research work was supported by many other prestigious awards as well, including fellowships from the American Schools of Prehistoric Research (2002–2004 and 2007–2008), the Guggenheim Memorial Foundation (2003–2004), the American Institute for Iranian Studies (2005–2006), and the American Institute for Afghanistan Studies (2008–2009). Between 2010 and 2012, Irene flourished at Oxford University’s Research Laboratory for Archaeology and the History of Art as an Arts and Humanities Research Council Postdoctoral Fellow. Her close working relationship with her Oxford colleagues fostered a highly productive period of research and publications on textiles from Iran, and surveys of cloth production and use in the ancient world. She was actively involved in Oxford University’s *Below the Salt* project, which examines human remains and material culture from the ancient Douzlakh salt mine at Chahrabad, in Zanjan province in northwestern Iran. This project offers a rare chance to study the textiles of everyday workers who were accidentally buried c. 400 BCE while working the mines, the salt-rich

soil preserving many of the organic remains and providing a rare opportunity to investigate the textiles of a non-elite ancient population.

For the last several years of her life, Irene was engaged in at least five major research projects, most of which resulted in important scholarly publications that are presented in the list below. Since 2006, Irene served as co-director of the *Sarazm Project and the Tajik-American Joint Archaeological Reconnaissance*, collaborating with the Tajik Academy of Sciences and the National Museum of Antiquities in Dushanbe, Tajikistan. This Central Asian work built upon her longstanding involvement with Victor Mair and Elizabeth Barber in the *Tarim Basin Mummies Project*, which for many years has brought together American, Chinese, European, and Central Asian collaborators in a multidisciplinary study of the superbly preserved mummies and related finds spanning several millennia in Xinjiang Uyghur Autonomous Region, northwest China.

The *Silk Project* was a broad, collaborative endeavor to understand the antiquity and nature of early sericulture, looking primarily at data from northwest China and south and central Asia. In her 1995 article “On the question of silk in pre-Han Eurasia,” Irene raised the possibility of indigenous wild silk being exploited for weaving by peoples living to the north and west of China, thereby disputing a misconception of early transmission of Chinese silk in the Bronze Age. In her 2009 article, “New Evidence for Early Silk in the Indus Civilization,” she and her collaborators Jonathan Mark Kenoyer and Richard Meadow identified silk remains inside of some Indus metal and steatite artifacts dating from the late third millennium BCE as having been produced by two silk moth species that had not been exploited in ancient China. These finds represent the earliest evidence of silk textiles outside of China (and are roughly contemporaneous with the earliest Chinese silk, dating from mid-third millennium BCE contexts of the Neolithic Liangzhu culture in eastern China), and challenge the longstanding belief that China had an exclusive monopoly on the production of silk at this time. In her silk research, Irene’s improvements in analytical methods supported the exploration of increasingly detailed research questions about silk production. Building upon the traditional focus on morphological observations of recovered fibers and textiles, she concentrated on the biochemical analysis of fibroin, the filament protein that can be recovered and studied even in very poorly preserved specimens. Combined with the power of scanning electron microscopy, this allowed her to precisely identify the species of silk moth that produced a given specimen.

This work on early silk was paralleled by her *Origins of Wool* project, through which she hoped to build up a database of genetic signatures of sheep breeds that could shed light on the development of woolly fleece. Since 1981 Irene was very much influenced by her friend Andrew Sherratt’s work (that was later expanded by Haskel Greenfield and others) on what he termed the “Secondary Products Revolution,” which saw the first domestication of livestock for their primary products (meat and leather), and a second intensification of domestication for their secondary products (usually defined as milk, wool, and traction).

In contrast to these primarily biochemical and physical studies of textiles, the *Social Archaeology of Cloth* project provided, in Irene’s words, “... connectivity between materials science and semiotic approaches to the study of material culture.” Irene’s ethnoarchaeological exploration of textiles across time and space promised to combine materials research with cultural symbolism and ethnic identity. This sweeping approach to studying the social context of textiles in Central Asia formed the basis for her planned book *Cloth and Carpet in Early Inner Asia*, which sadly was still only in manuscript form when she passed away.

In addition to her path-breaking research work on all aspects of textile production and use, Irene taught in a number of different university settings. As a doctoral candidate, she taught at the University of Pennsylvania, and afterward, at Boston University, Bryn Mawr College, the University of Massachusetts, Harvard, and Oxford. During the past decade, she directed or served as an outside reader for several outstanding doctoral dissertations, including Karin Margarita Frei, *Strontium Isotope Analysis and Wool Provenance of Iron Age Textiles from Danish Peat Bogs* (University of Copenhagen, 2010); Xian Zhang, *The Development of Mild Extraction Methods for the Analysis of Natural Dyes in Textiles of Historical Interest using LC-Diode Array*

Detector-MS (Boston University, 2007); Mariner Padwa, *Ancient Kroraina: An Archaeology of Inner Asian Oasis Life* (Harvard, 2007); Christine Kimbrough, *From Flock to Frock: Textile Production in Third Millennium BCE Northern Mesopotamia* (New York University, 2006); and Judith Ann Cameron, *Textile Technology in the Prehistory of Southeast Asia* (Australia National University, 2004).

Irene's passion for knowledge and enviable work ethic earned her a respected place in the field of archaeology. As a child, Irene learned to crochet from her grandmother, instilling a lifelong interest in the universality of textiles that she pursued through archaeological research. Irene's unyielding optimism and determined spirit allowed her to advance professionally even in the face of adversity. While Irene's aim was to explore and examine the rich material cultural connections throughout Eurasia, her geographic areas of interest often took her to modern nations embroiled in armed conflict. Though working in these parts of the world brought great risk and numerous difficulties, her time spent in Central Asia was eye opening, and she came to appreciate the ingenuity of the people who have lived in this region for millennia in spite of the many natural, environmental, and political hardships placed on them. Surrounded by microscopes and archaeological samples, Irene kept alive her passion for ancient textile studies until her final days.

Among her unfinished works-in-progress, in addition to the already mentioned book on *Cloth and Carpet in Early Inner Asia*, are two more manuscripts entitled *From Wild Lands: Community and Identity in Early Inner Asia*, planned to be co-edited with Kenneth Lymer, as well as *Weaving the Four Quarters: Andean Textiles of the Peabody Museum*, based on her research of Peabody's textile collection. She was also still working until her last weeks on articles and book chapters intended for submission, including *Templates of Garment in Early Inner Asia: a Social History of Indo-Iranian Dress* that was to appear in *Global Textile Encounters*, edited by Marie-Louise Nosch, Zhao Feng and Lotika Varadarajan, a volume intended to bring scholarly research on textiles to a broad public audience.

In her talk "From Han Silk to *Samitum*" at the Silk Trade Workshop at the Mahindra Humanities Center at Harvard on 20–21 April 2012, which she unfortunately could not attend due to the state of her health, Irene planned to address questions concerning early compound weaves and loom technologies in late pre-Islamic inner Asia. As described in her abstract, "Compound weaves are complex cloth structures associated with an advanced weaving apparatus known as the drawloom. In the history of textiles, there are competing ideas on the origins of this advanced form of weave. One prevailing theory is that it developed exclusively in China (c. 400 BCE), appearing first as warp-faced compound tabby and then as compound twills. Weft-faced compound weaves, made of wool, were then adopted in western Asia several centuries later. A competing theory reasons that compound weaves developed in the West and traveled east. A third theory posits that they developed independently in China and the ancient Near East." Irene's paper was intended to review the available evidence for early compound weaves in Eurasia, discuss the inferential problems involved, and suggest a resolution of apparently contradictory evidence.

After a long struggle against breast cancer, Irene passed away peacefully on February 3, 2013 in Westwood, Massachusetts, surrounded by the family she cherished — her children, Ianna and Stephen, her mother, Georgiana Good, her sister, Linda (Good) Vergo, and her friend, Colin Varga. She now rests peacefully at the Holy Transfiguration Monastery in Brookline, Massachusetts, having left behind a scholarly legacy of interdisciplinary research that combines anthropology, archaeology, and technical studies of fiber analysis that weaves a foundation for understanding the interplay between humans and textiles.

Key publications

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Irene Good with her son Stephen in Tajikistan (photo taken with Irene Good's camera, retrieved by Colin Varga, used by kind permission of Bruce Weinstein)